GROUP 13A

MULTIPORT FUEL INJECTION (MPI) <4A9>

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GENERAL INFORMATION

M1131000102741

The Multipoint Fuel Injection System consists of sensors which detect the engine conditions, the engine-ECU <M/T> or engine-CVT-ECU <CVT> which controls the system based on signals from these sensors, and actuators which operate under the control of the engine-ECU <M/T> or engine-CVT-ECU <CVT>. The engine-ECU <M/T> or engine-CVT-ECU <CVT> carries out activities such as fuel injection control, idle speed control and ignition timing control. In addition, the engine-ECU <M/T> or engine-CVT-ECU <CVT> is equipped with several diagnosis modes which simplify trouble-shooting when a problem develops.

FUEL INJECTION CONTROL

The injector drive times and injection timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions.
A single injector is mounted at the intake port of each cylinder. Fuel is sent under pressure from the fuel tank by the fuel pump, with the pressure being regulated by the fuel pressure regulator. The fuel thus regulated is distributed to each of the injectors.
Fuel injection is normally carried out once for each cylinder for every two rotations of the crankshaft. The firing order is 1-3-4-2. This is called sequential fuel injection. The engine-ECU <M/T> or engine-CVT-ECU <CVT> provides a richer air/fuel mixture by carrying out "open-loop" control when the engine is cold or operating under high load conditions in order to maintain engine performance. In addition, when the engine is warm or operating under normal conditions, the engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the air/fuel mixture by using the oxygen sensor signal to carry out "closed-loop" control in order to obtain the theoretical air/fuel mixture ratio that provides the maximum cleaning performance from the three way catalyst.

THROTTLE VALVE OPENING CONTROL

This system electrically controls the opening of the throttle valve. The engine-ECU <M/T> or engine-CVT-ECU <CVT> detects the amount of travel of the accelerator pedal via the accelerator pedal position sensor, and controls the actuation of the throttle valve control servo, which is mounted on the throttle body, in order to attain the target throttle valve opening that has been predetermined in accordance with driving conditions.

IDLE SPEED CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that passes through the throttle valve in accordance with changes in idling conditions and engine load during idling.
The engine-ECU <M/T> or engine-CVT-ECU <CVT> drives the throttle valve control servo to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and A/C and other electrical load. In addition, when the air conditioning switch is turned off and on while the engine is idling, the throttle valve control servo adjusts the throttle valve passes through air amount according to the engine load conditions to avoid fluctuations in the engine speed.

IGNITION TIMING CONTROL

The power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing in order to provide the optimum ignition timing with respect to the engine operating conditions. The ignition timing is determined by the engine-ECU <M/T> or engine-CVT-ECU <CVT> from the engine speed, intake air volume, engine coolant temperature and atmospheric pressure.

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SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in one of the sensors or actuators related to emission control, the engine warning lamp (check engine lamp) illuminates as a warning to the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnosis code corresponding to the abnormality is output.
- The RAM data inside the engine-ECU <M/T> or engine-CVT-ECU <CVT> that is related to the sensors and actuators can be read by means of the M.U.T.-III. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS

1. Fuel Pump Control

Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.

2. A/C Relay Control

Turns the compressor clutch of the A/C ON and OFF.

3. Oil Feeder Control Valve Control

The engine-ECU <M/T> or engine-CVT-ECU <CVT> carries out the duty control of the oil feeder control valve according to the operation condition. This varies the phase angle of the intake camshaft to optimize the intake valve timing.

4. Fan Motor Control

The revolutions of the cooling fan is controlled in response to the engine coolant temperature and vehicle speed.

5. Alternator Output Current Control

Prevents alternator output current from increasing suddenly and idle speed from dropping at times such as when the headlamp are turned on.

6. Purge Control Solenoid Valve Control

(Refer to P.17-13, GROUP 17 – Engine And Emission Control – Evaporative Emission Control System).

7. EGR Control Solenoid Valve Control <CVT>

[Refer to P.17-19, GROUP 17 – Engine And Emission Control – Exhaust Gas Recirculation (EGR) System].

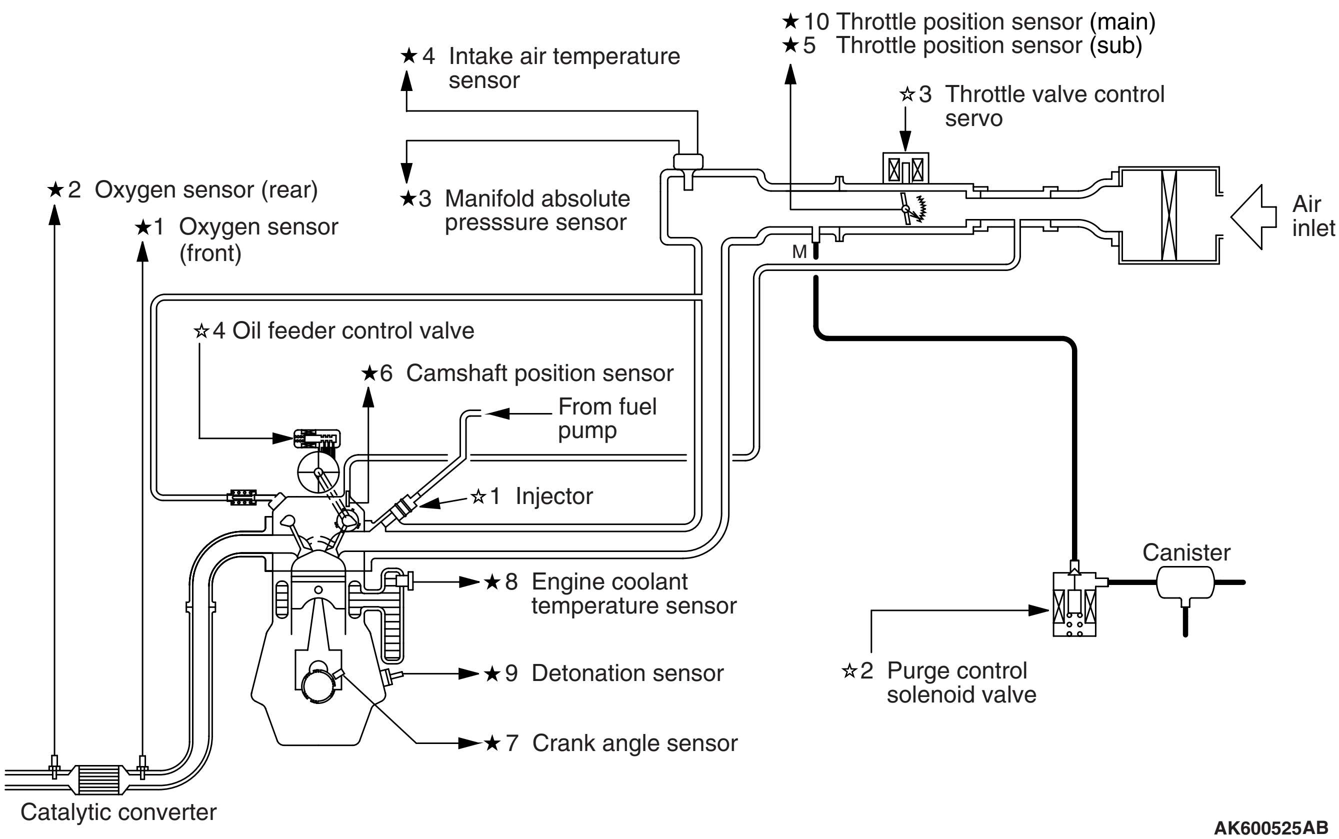
GENERAL SPECIFICATIONS

Items			**Specifications**
Throttle body	Throttle bore mm		45
	Throttle position sensor		Hall element type
	Throttle valve control servo		DC motor type, having broshes
Engine-ECU <M/T> or engine-CVT-ECU <CVT>	Identification No.	Engine-ECU <M/T>	E6T45193
		Engine-CVT-ECU <CVT>	E6T45186
Sensors	Barometric pressure sensor		Semiconductor type
	Intake air temperature sensor		Thermistor type
	Engine coolant temperature sensor		Thermistor type
	Oxygen sensor		Zirconia type
	Accelerator pedal position sensor		Hall element type
	Camshaft position sensor		Magneto resistance element type
	Crank angle sensor		Magneto resistance element type
	Detonation sensor		Piezoelectric type
	Manifold absolute pressure sensor		Semiconductor type
Actuators	Engine control relay type		Contact switch type
	Fuel pump relay type		Contact switch type
	Injector type and number		Electromagnetic type, 4
	Injector identification mark		CDH166
	Throttle valve control servo relay		Contact switch type
	Oil feeder control valve		Duty cycle type solenoid valve
	EGR valve <CVT>		Stepper motor
	Purge control solenoid valve		Duty cycle type solenoid valve

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM

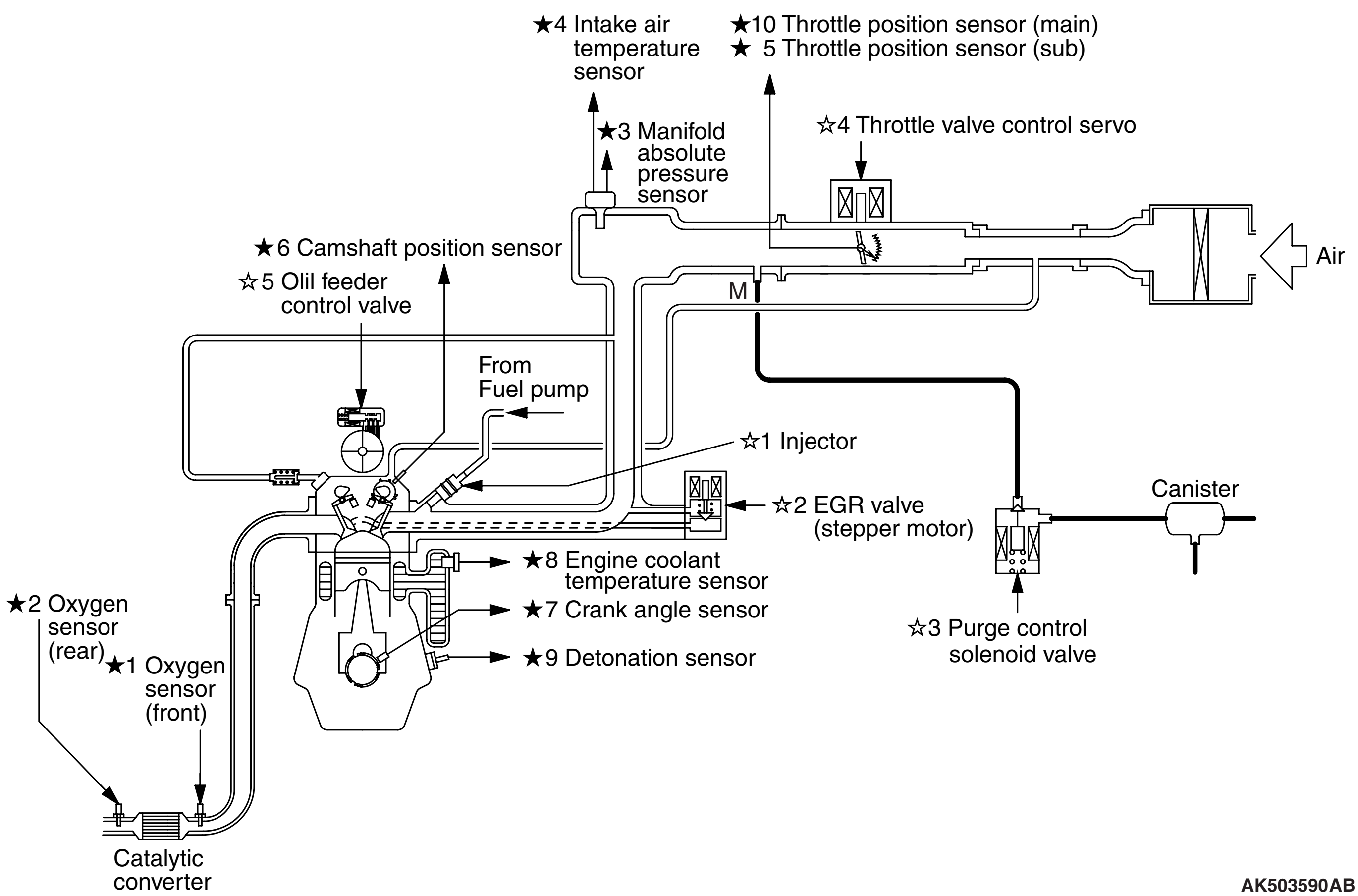
<M/T>

Sensors	Switches / signals		Engine-ECU		Actuators	Relays / outputs
★1 Oxygen sensor (front) ★2 Oxygen sensor (rear) ★3 Manifold absolute presssure sensor ★4 Intake air temperature sensor ★5 Throttle position sensor (sub) ★6 Camshaft position sensor ★7 Crank angle sensor ★8 Engine coolant temperature sensor ★9 Detonation sensor ★10 Throttle position sensor (main)	● Power supply ● Ignition switch-IG ● Ignition switch-ST ● Accelerator pedal position sensor (main) ● Accelerator pedal position sensor (sub) ● Alternator FR terminal ● Stop lamp switch	⇨	Engine-ECU ● Barometric pressure sensor	⇨	☆1 Injector ☆2 Purge control solenoid valve ☆3 Throttle valve control servo ☆4 Oil feeder control valve	● Engine control relay ● Fuel pump relay ● A/C compressor relay ● Throttle valve control servo relay ● Ignition coil ● Cooling fan control relay ● Diagnosis output ● Alternator G terminal ● Oxygen sensor heater (front) ● Oxygen sensor heater (rear)



<CVT>

Inputs (sensors)	Inputs (switches)		Engine-CVT-ECU		Outputs (actuators)	Outputs (relays/signals)
★ 1 Oxygen sensor (front) ★ 2 Oxygen sensor (rear) ★ 3 Manifold absolute pressure sensor ★ 4 Intake air temperature sensor ★ 5 Throttle position sensor (sub) ★ 6 Camshaft position sensor ★ 7 Crank angle sensor ★ 8 Engine coolant temperature sensor ★ 9 Detonation sensor ★ 10 Throttle position sensor (main)	● Power supply ● Ignition switch-IG ● Ignition switch-ST ● Accelerator pedal position sensor (main) ● Accelerator pedal position sensor (sub) ● Inhibitor switch ● Alternator FR terminal ● Stop lamp switch	⇨	Engine-CVT-ECU ● Barometric pressure sensor	⇨	☆ 1 Injector ☆ 2 EGR valve (stepper motor) ☆ 3 Purge control solenoid valve ☆ 4 Throttle valve control servo ☆ 5 Oil feeder control valve	● Engine control relay ● Fuel pump relay ● A/C compressor relay ● Throttle valve control servo relay ● Ignition coil ● Fan control relay ● Diagnosis output ● Alternator G terminal ● Oxygen sensor heater



SERVICE SPECIFICATIONS

M1131000301269

Items		Specifications
Intake air temperature sensor resistance kΩ	–20°C	13 – 17
	0°C	5.3 – 6.7
	20°C	2.3 – 3.0
	40°C	1.0 – 1.5
	60°C	0.56 – 0.76
	80°C	0.30 – 0.42
Engine coolant temperature sensor resistance kΩ	–20°C	14 – 17
	0°C	5.1 – 6.5
	20°C	2.1 – 2.7
	40°C	0.9 – 1.3
	60°C	0.48 – 0.68
	80°C	0.26 – 0.36
Oxygen sensor output voltage (at racing) V		0.6 – 1.0
Oxygen sensor heater resistance (at 20°C) Ω		5 – 30
Fuel pressure kPa		Approximately 324
Injector coil resistance (at 20°C) Ω		14 – 15
Throttle valve control servo coil resistance (at 20°C) Ω		0.3 – 100
Oil feeder control valve (at 20°C) Ω		6.9 – 7.9

SEALANT

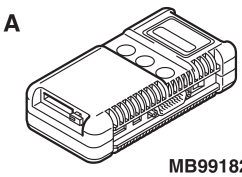
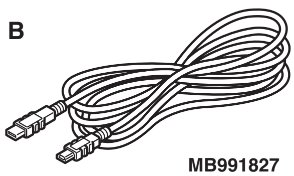
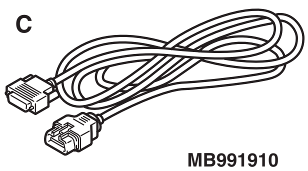
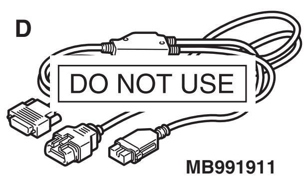
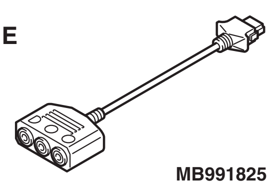
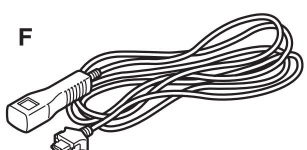
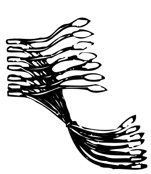
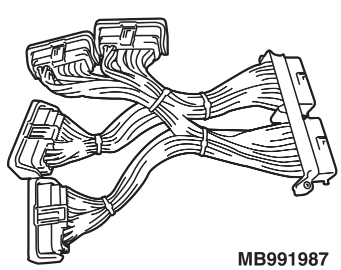
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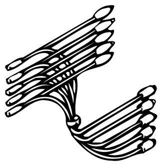
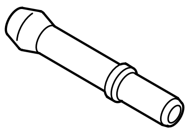
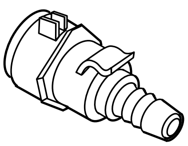
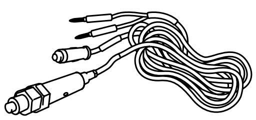
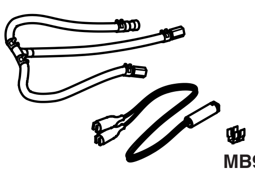
Item	Specified sealant	Remark
Engine coolant temperature sensor Threaded portion	LOCTITE262 or equivalent	Drying sealant

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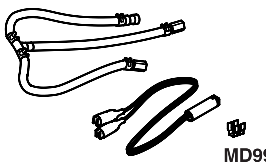
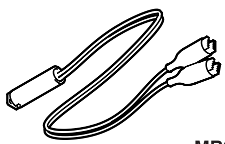
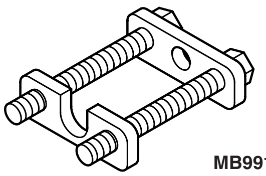
SPECIAL TOOLS

M1131000601840

Tool	Number	Name	Use
A  MB991824 B  MB991827 C  MB991910 D  MB991911 E  MB991825 F  MB991826 MB991955	MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826	M.U.T.-III sub assembly A: Vehicle communication interface (V.C.I.) B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III measurement adapter F: M.U.T.-III trigger harness	• Reading diagnosis code • MPI system inspection • Measurement of fuel pressure ⚠ CAUTION **For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.**
	MB991709	Test harness	• Measurement of voltage during troubleshooting • Inspection using an oscilloscope
 MB991987	MB991987	Power plant ECU check harness	• Measurement of voltage during Troubleshooting • Inspection using an oscilloscope • Inspection of the engine-ECU <M/T> engine-CVT-ECU <CVT> terminal voltage check

Tool	Number	Name	Use
 MB991658	MB991658	Test harness	• Measurement of voltage during Troubleshooting • Inspection using an oscilloscope • Inspection of oxygen sensor
 MB992001	MB992001	Hose adaptor	• Measurement of fuel pressure • Checking the spray condition of injectors
 MB991990	MB991990	Quick connector	Measurement of fuel pressure
 MB991637	MB991637	Fuel pressure gauge set	
 MB991981	MB991981	Fuel pressure gauge set	
 MB992076	MB992076	Injector test set	• Measurement of fuel pressure • Checking the spray condition of injectors

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Tool	Number	Name	Use
 MD998706	MD998706	Injector test set	• Measurement of fuel pressure • Checking the spray condition of injectors
 MB991607	MB991607	Injector test harness	Checking the spray condition of injector
 MB991976	MB991976	Injector test holder assembly	

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

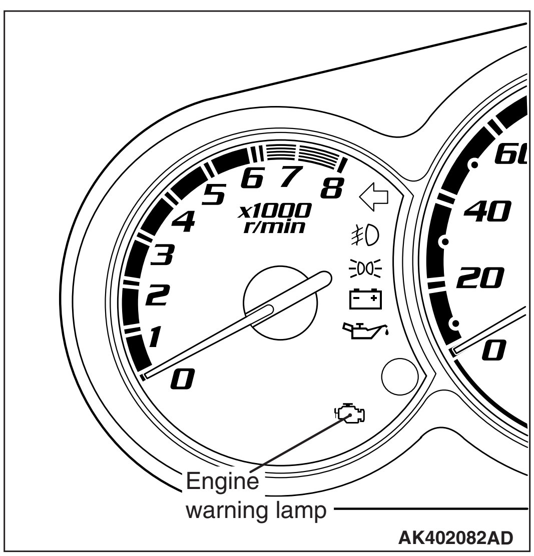
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Refer to P.00-13, GROUP 00 – How to Use Trouble-shooting/Inspection Service Points – How to Cope with Intermittent Malfunctions.

DIAGNOSIS FUNCTION

M1131155501840

ENGINE WARNING LAMP (CHECK ENGINE LAMP)



If an abnormality occurs in any of the following items related to the Multipoint Fuel Injection (MPI) system, the engine warning lamp will illuminate.

If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

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ENGINE WARNING LAMP INSPECTION ITEMS

Code No.	Diagnosis item
–	Engine-ECU <M/T> or engine-CVT-ECU <CVT>
P0105	Manifold absolute pressure sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0122*	Throttle position sensor (main) circuit low input
P0123*	Throttle position sensor (main) circuit high input
P0125*	Feedback system monitor
P0130	Oxygen sensor (front) system
P0135	Oxygen sensor (front) heater system
P0136	Oxygen sensor (rear) system
P0141	Oxygen sensor (rear) heater system
P0170	Abnormal fuel system
P0201	No. 1 injector system
P0202	No. 2 injector system
P0203	No. 3 injector system
P0204	No. 4 injector system
P0222*	Throttle position sensor (sub) circuit low input
P0223*	Throttle position sensor (sub) circuit high input
P0300*	Random/multiple cylinder misfire detected
P0301*	No. 1 cylinder misfire detected
P0302*	No. 2 cylinder misfire detected
P0303*	No. 3 cylinder misfire detected
P0304*	No. 4 cylinder misfire detected
P0325	Detonation sensor system
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	Exhaust gas recirculation control system <CVT>
P0421	Warm up catalyst malfunction
P0443	Purge control solenoid valve system
P0500	Vehicle speed signal system <M/T>
P0606	Microcomputer malfunction system <CVT>
P0638*	Throttle valve control servo circuit range/performance problem
P0642*	Throttle position sensor power supply
P0657*	Throttle valve control servo relay circuit malfunction
P1021	Oil control valve system
P1602*	Communication malfunction (between engine-ECU <M/T> or engine-CVT-ECU <CVT> main processor and system LSI)
P1603*	Battery backup circuit malfunction
P2100*	Throttle valve control servo circuit (open)
P2101*	Throttle valve control servo magneto malfunction

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Code No.	Diagnosis item
P2108*	Throttle valve control servo processor malfunction
P2122*	Accelerator pedal position sensor (main) circuit low input
P2123*	Accelerator pedal position sensor (main) circuit high input
P2127*	Accelerator pedal position sensor (sub) circuit low input
P2128*	Accelerator pedal position sensor (sub) circuit high input
P2135*	Throttle position sensor (main and sub) range/performance problem
P2138*	Accelerator pedal position sensor (main and sub) range/performance problem
P2226	Barometric pressure sensor system
U1108	Combination meter time-out

NOTE:

- *If the engine warning lamp illuminates because of a malfunction of the engine-ECU <M/T> or engine-CVT-ECU <CVT>, communication between M.U.T.-III and the engine-ECU <M/T> or engine-CVT-ECU <CVT> is impossible. In this case, the diagnosis code cannot be read.*
- *After the engine-ECU <M/T> or engine-CVT-ECU <CVT> has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected.However, for items marked with a "*" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.*
- *After the engine warning lamp illuminates, it will be switched off under the following conditions.*
  - *When the engine-ECU <M/T> or engine-CVT-ECU <CVT> monitored the power train malfunction three times* met set condition requirements, it detected no malfunction.*

  : In this case, "one time" indicates from engine start to stop.
  - *For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.*
- *Sensor 1 indicates, the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.*

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to P.00-7, GROUP 00 – How to Use Trouble-shooting/Inspection Service Points – Diagnosis Function.

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the M.U.T.-III.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

NOTE: . By turning the ignition switch to OFF, the engine-ECU <M/T> or engine-CVT-ECU <CVT> will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

INSPECTION USING M.U.T.-III DATA LIST AND ACTUATOR TESTING

1. Carry out inspection by means of the data list and the actuator test function, if there is an abnormality, check and repair the chassis harness and components.
2. After repairing, re-check using the M.U.T.-III and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the M.U.T.-III, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

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FREEZE FRAME DATA

When the engine-ECU <M/T> or engine-CVT-ECU <CVT> detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame data". By analyzing this "Freeze frame" data with the M.U.T.-III, an effective troubleshooting can be performed.
The display items of freeze frame data are shown below.

DISPLAY ITEM LIST

Item No.	Data		Unit
13	Intake air temperature sensor		°C
21	Engine coolant temperature sensor		°C
22	Crank angle sensor		r/min
24	Vehicle speed		km/h
32	Manifold absolute pressure sensor		kPa
44	Ignition advance		deg
81	Long-term fuel compensation		%
82	Short-term fuel compensation		%
87	Calculation load value		%
88	Fuel control condition	Open loop	OL
		Closed loop	CL
		Open loop owing to drive condition	OL-DRV.
		Open loop owing to system malfunction	OL-SYS.
		Closed loop based on one oxygen sensor	CL-H02S
89	Fuel control condition		–
A1	Oxygen sensor (front)		V
A2	Oxygen sensor (rear)		V

NOTE: If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

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DRIVE CYCLE

The following five drive cycle patterns are performed on the diagnosis codes monitored during the vehicle driving. The vehicle driving requires the patterns to identify the fault. In other words, doing such a drive allows to regenerate any kind of trouble which involves illuminating the engine warming lamp (check engine lamp) and to verify the repair procedure has eliminated the trouble [the engine warming lamp (check engine lamp) is no longer illuminated].

⚠ CAUTION

Two technicians should always be in the vehicle when carrying out a test drive.

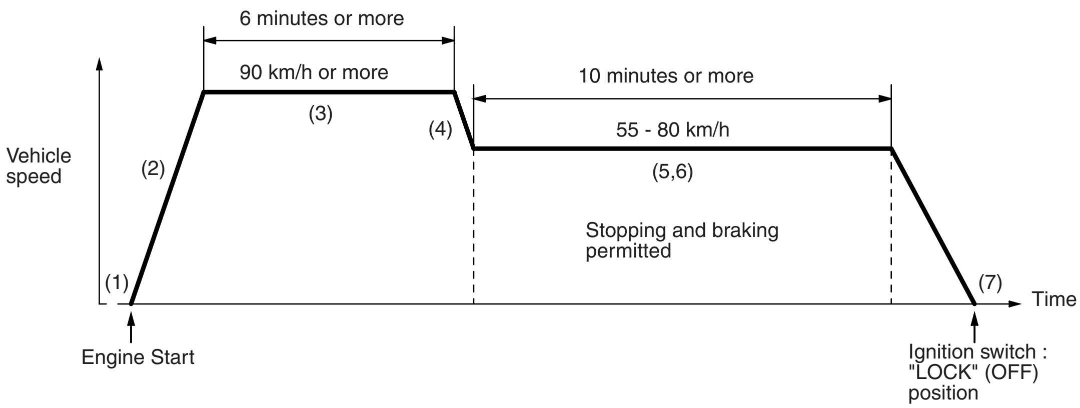
NOTE: Check that the diagnosis code is not output before traveling in the Drive cycle pattern. Erase the diagnosis code if it has been output.

DRIVE CYCLE PATTERN LIST

Procedure	Monitor item	Diagnosis code
1	Catalytic converter monitor	P0421
2	Oxygen sensor (front) monitor	P0130
3	Other monitor	P0135, P0136, P0141, P0201, P0202, P0203, P0204, P0301, P0302, P0303, P0304, P0325, P0638

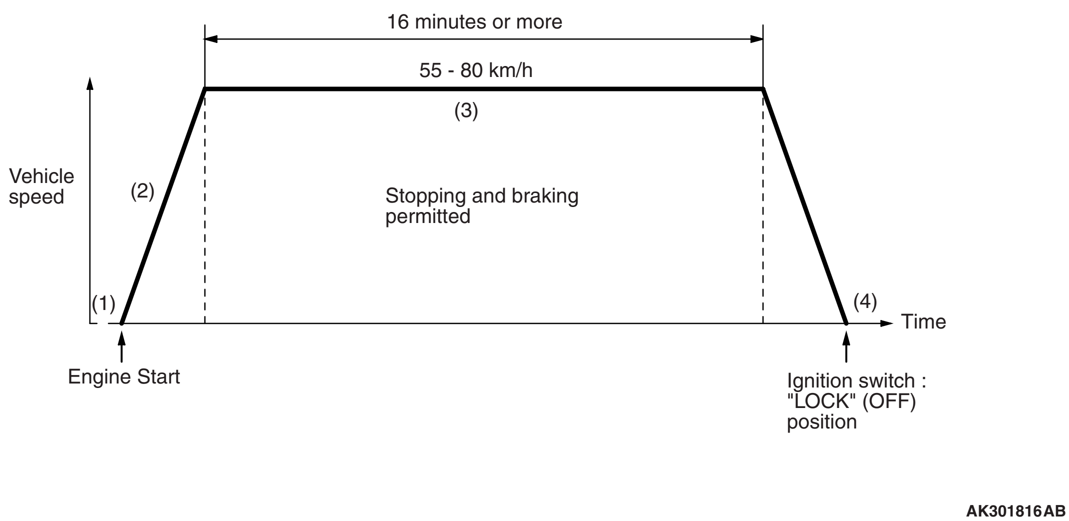
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Procedure 1

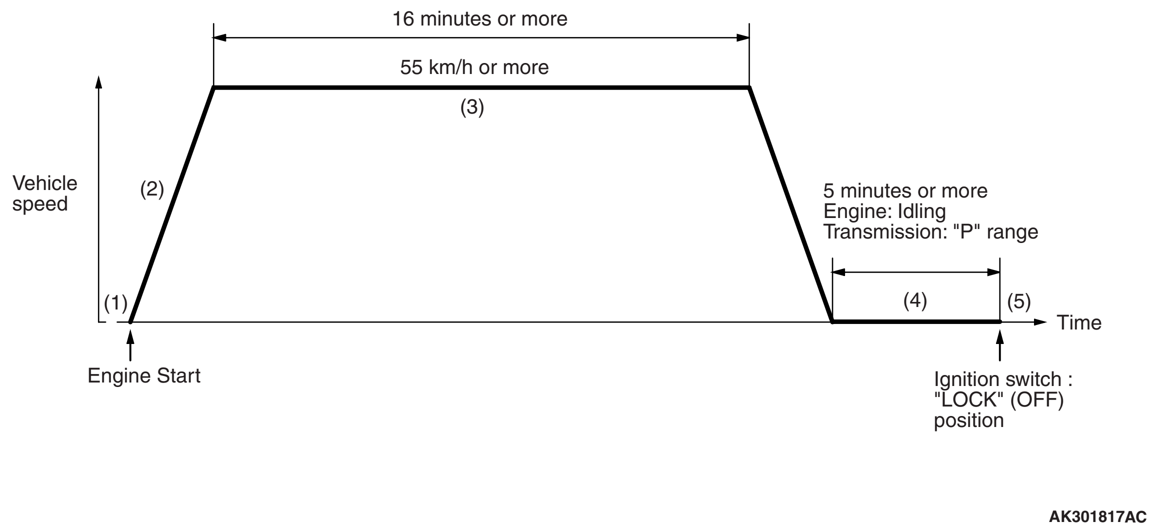
Catalytic converter monitor	
Diagnosis code No.	P0421
Drive cycle pattern	One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more.  AK301815AB
Inspection condition	• Atmospheric temperature: –10°C or more
Test procedure	1. Engine: start 2. Accelerate until the vehicle speed is 90 km/h or more. 3. Travel for 6 minutes or more while keeping the vehicle speed at 90 km/h or more. 4. Decelerate until the vehicle speed is within 80 km/h or less. 5. While traveling at 55 – 80 km/h for 10 minutes or more, fully close the throttle at least once in 2 minutes and decelerate for 10 seconds or more. • Do not repeat deceleration too often. • Vehicle speed may go below 55 km/h after the deceleration. • Stopping and braking are permitted. (If stopped or drive at 55 km/h or less for more than 5 minutes the monitoring may be stopped. In this case please restart monitoring from the beginning.) 6. After completing the above deceleration, bring the vehicle speed back to 55 – 80 km/h and keep it in the range until starting the deceleration again. • Repeat the above deceleration at least 5 times. 7. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.

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Procedure 2

Oxygen sensor (front) monitor	
Diagnosis code No.	P0130
Drive cycle pattern	One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more. 
Inspection conditions	• Engine coolant temperature: After engine warm up • Atmospheric temperature: –10°C or more
Test procedure	1. Engine: start 2. Accelerate until the vehicle speed is 55 – 80 km/h. 3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 – 80km/h and travel for 16 minutes or more. • Stopping and braking during this operation are permitted. 4. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.

Procedure 3

<table>
<tr><th colspan="2">Other monitor</th></tr>
<tr><td>Diagnosis code No.</td><td>P0135, P0136, P0141, P0201, P0202, P0203, P0204, P0301, P0302, P0303, P0304, P0325, P0638</td></tr>
<tr><td>Drive cycle pattern</td><td>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 21 minutes or more.

</td></tr>
<tr><td>Inspection conditions</td><td>• Engine coolant temperature: After engine warm up
• Atmospheric temperature: −10°C or more</td></tr>
<tr><td>Test procedure</td><td>1. Engine: start
2. Accelerate until the vehicle speed is 55 km/h.
3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 km/h and travel for 16 minutes or more.
4. Return the vehicle to the shop.
5. After stopping the vehicle, continue idling for 5 minutes, and then turn the ignition switch to "LOCK" (OFF) position.</td></tr>
</table>

READINESS TEST STATUS

The engine-ECU <M/T> or engine-CVT-ECU <CVT> monitors the following main diagnosis items, judges if these items are in good condition or not, and the stores its history. this history can be read out by using M.U.T.-III. (If the ECU has judged a item before, the M.U.T.-III displays "Complete").

In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).

- Catalyst: P0421
- Oxygen sensor: P0130, P0136
- Oxygen sensor heater: P0135, P0141

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FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

Malfunctioning item	Control contents during malfunction
Intake air temperature sensor	Controls as if the intake air temperature is 25°C.
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.
Throttle position sensor (main)	• Controls the throttle valve position through the use of the throttle position sensor (sub) signal. • Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. • Prohibits the operation of the engine speed feedback control. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronic-controlled throttle valve system if the throttle position sensor (sub) is also malfunctioning.
Throttle position sensor (sub)	• Controls the throttle valve position through the use of the throttle position sensor (main) signal. • Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronic-controlled throttle valve system if the throttle position sensor (main) is also malfunctioning.
Accelerator pedal position sensor (main)	• Detects the amount of the accelerator pedal travel through the use of the accelerator pedal position sensor (sub) signal, but rendering it only as being approximately one-half the normal opening angle. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronic-controlled throttle valve system if the accelerator pedal position sensor (sub) is also malfunctioning.
Accelerator pedal position sensor (sub)	• Detects the amount of the accelerator pedal travel through the use of the accelerator pedal position sensor (main) signal, but rendering it only as being approximately one-half the normal opening angle. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronic-controlled throttle valve system if the accelerator pedal position sensor (main) is also malfunctioning.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C. (This control will be continued until the ignition switch is turned to the "LOCK" (OFF) position even though the sensor signal returns to normal.)
Camshaft position sensor	Injects fuel into the cylinders in the order 1-3-4-2 with irregular timing. (After the ignition switch is turned to the "ON" position, the No. 1 cylinder top dead center is not detected at all.)
Oxygen sensor <front>	Air/fuel ratio closed loop control is not performed.
Oxygen sensor <rear>	Performs the closed loop control of the air/fuel ratio by using only the signal of the oxygen sensor (front) installed on the front side of the catalytic converter.
Detonation sensor	The ignition timing is set having enough time against knocking.

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Malfunctioning item	Control contents during malfunction
Ignition coil (incorporating power transistor)	Cuts off the fuel supply to cylinders with an abnormal ignition.
Alternator FR terminal	Does not control the output of the alternator according to an electrical load. (works as a normal alternator)
Misfiring	If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down.
Throttle valve position feedback	• Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of the engine speed feedback control.
Throttle valve control servo	• Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of the engine speed feedback control.
Engine-ECU <M/T> or engine-CVT-ECU <CVT> main processor	• Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of the engine speed feedback control.
Communication between powertrain control module main processor and system LSI	• Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. • Prohibits the operation of the engine speed feedback control. • Cuts off fuel when the engine speed exceeds 3,000 r/min.

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INSPECTION CHART FOR DIAGNOSIS CODE

M1131151002415

⚠ CAUTION

If the ignition switch is turned to the "ON" position with a connector or other electrical connections disconnected during troubleshooting of a system, a diagnosis code may be set for other systems. After finishing troubleshooting, check diagnosis codes for all systems, and if any codes have been set, erase these codes.

Code No.	Diagnosis item	Reference page
P0011	Variable valve timing system	P.13A-22
P0105	Manifold absolute pressure sensor system	P.13A-23
P0110	Intake air temperature sensor system	P.13A-34
P0115	Engine coolant temperature sensor system	P.13A-42
P0122*	Throttle position sensor (main) circuit low input	P.13A-50
P0123*	Throttle position sensor (main) circuit high input	P.13A-54
P0125*	Feedback system monitor	P.13A-57
P0130	Oxygen sensor (front) system	P.13A-62
P0135	Oxygen sensor (front) heater system	P.13A-69
P0136	Oxygen sensor (rear) system	P.13A-75
P0141	Oxygen sensor (rear) heater system	P.13A-81
P0170	Abnormal fuel system	P.13A-87
P0201	No. 1 injector system	P.13A-89
P0202	No. 2 injector system	P.13A-94
P0203	No. 3 injector system	P.13A-99
P0204	No. 4 injector system	P.13A-104
P0222*	Throttle position sensor (sub) circuit low input	P.13A-109
P0223*	Throttle position sensor (sub) circuit high input	P.13A-113
P0300*	Random/multiple cylinder misfire detected	P.13A-116
P0301*	No. 1 cylinder misfire detected	P.13A-118
P0302*	No. 2 cylinder misfire detected	P.13A-121
P0303*	No. 3 cylinder misfire detected	P.13A-124
P0304*	No. 4 cylinder misfire detected	P.13A-127
P0325	Detonation sensor system	P.13A-130
P0335	Crank angle sensor system	P.13A-134
P0340	Camshaft position sensor system	P.13A-143
P0403	Exhaust gas recirculation control system <CVT>	P.13A-153
P0421	Warm up catalyst malfunction	P.13A-158
P0443	Purge control solenoid valve system	P.13A-159
P0500	Vehicle speed signal system <M/T>	P.13A-165
P0513	Immobilizer malfunction	P.13A-166
P0603	EEP ROM malfunction	P.13A-168

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Code No.	Diagnosis item	Reference page
P0606	Microcomputer malfunction	P.13A-168
P0622	Alternator FR terminal system	P.13A-169
P0638*	Throttle valve control servo circuit range/performance problem	P.13A-173
P0642*	Throttle position sensor power supply	P.13A-176
P0657*	Throttle valve control servo relay circuit malfunction	P.13A-177
P1021	Oil feeder control valve system	P.13A-185
P1602*	Communication malfunction (between engine-ECU <M/T> or engine-CVT-ECU <CVT> main processor and system LSI)	P.13A-191
P1603*	Battery backup circuit malfunction	P.13A-192
P2100*	Throttle valve control servo circuit (open)	P.13A-194
P2101*	Throttle valve control servo magneto malfunction	P.13A-198
P2108*	Throttle valve control servo processor malfunction	P.13A-200
P2122*	Accelerator pedal position sensor (main) circuit low input	P.13A-201
P2123*	Accelerator pedal position sensor (main) circuit high input	P.13A-205
P2127*	Accelerator pedal position sensor (sub) circuit low input	P.13A-208
P2128*	Accelerator pedal position sensor (sub) circuit high input	P.13A-212
P2135*	Throttle position sensor (main and sub) range/performance problem	P.13A-215
P2138*	Accelerator pedal position sensor (main and sub) range/performance problem	P.13A-217
P2226	Barometric pressure sensor system	P.13A-223
U1073	Bus off	P.13A-224
U1102	ABS-ECU time-out	P.13A-225
U1106	EPS–ECU time-out	P.13A-226
U1108	Combination meter time-out	P.13A-228
U1110	A/C-ECU time-out	P.13A-229

NOTE:

- *Do not replace the engine-ECU <M/T> or engine-CVT-ECU <CVT> until a through terminal check reveals there are no short/open circuit.*
- *Check that the engine-ECU <M/T> or engine-CVT-ECU <CVT> earth circuit is normal before checking for the cause of the problem.*
- *After engine-ECU <M/T> or engine-CVT-ECU <CVT> has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with "*", the diagnosis code is recorded on the first detection of the malfunction.*

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INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. P0011: Variable Valve Timing System

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks whether the variable valve timing system has malfunction.

TROUBLE JUDGMENT

Check Conditions

- Engine is running.
- Oil feeder control valve operation: OFF
- The oil feeder control valve is normal <M/T>.
- Camshaft position sensor and crank angle sensor are normal <M/T>.

Judgment Criteria

- For 10 seconds, the phase angle of the intake camshaft is 15° or more.
- For 4 seconds, the electrical current of the oil feeder control valve monitor is abnormal <CVT>.

Check Condition

- Ignition switch is in "ON" position <M/T>.

Judgment Criterion

- Variable Valve Timing monitor current is abnormal <M/T>.

Check Condition

- Ignition switch is in "ON" position <M/T>.

Judgment Criteria

- The battery voltage is 9.0 V or more <M/T>.
- Variable Valve Timing monitor current is abnormal <M/T>.

Check Condition

- Ignition switch is in "ON" position <M/T>.

Judgment Criteria

- The battery voltage is 9.0 V or more <M/T>.
- The oil feeder control valve is in ON position <M/T>.
- Variable Valve Timing monitor current is abnormal <M/T>.

POSSIBLE CAUSES

- Failed oil feeder control valve
- Oil passage of variable valve timing control system clogged
- Variable valve timing sprocket operation system stuck
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check oil feeder control valve

- Check oil feeder control valve (Refer to P.13A-365).

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Replace oil feeder control valve.

STEP 2. Check for oil passage of variable valve timing control system clogged

Q: Is the check result normal?

YES : Go to Step 3 .
NO : Repair.

STEP 3. Check for variable valve timing sprocket operation system stuck

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Repair.

STEP 4. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

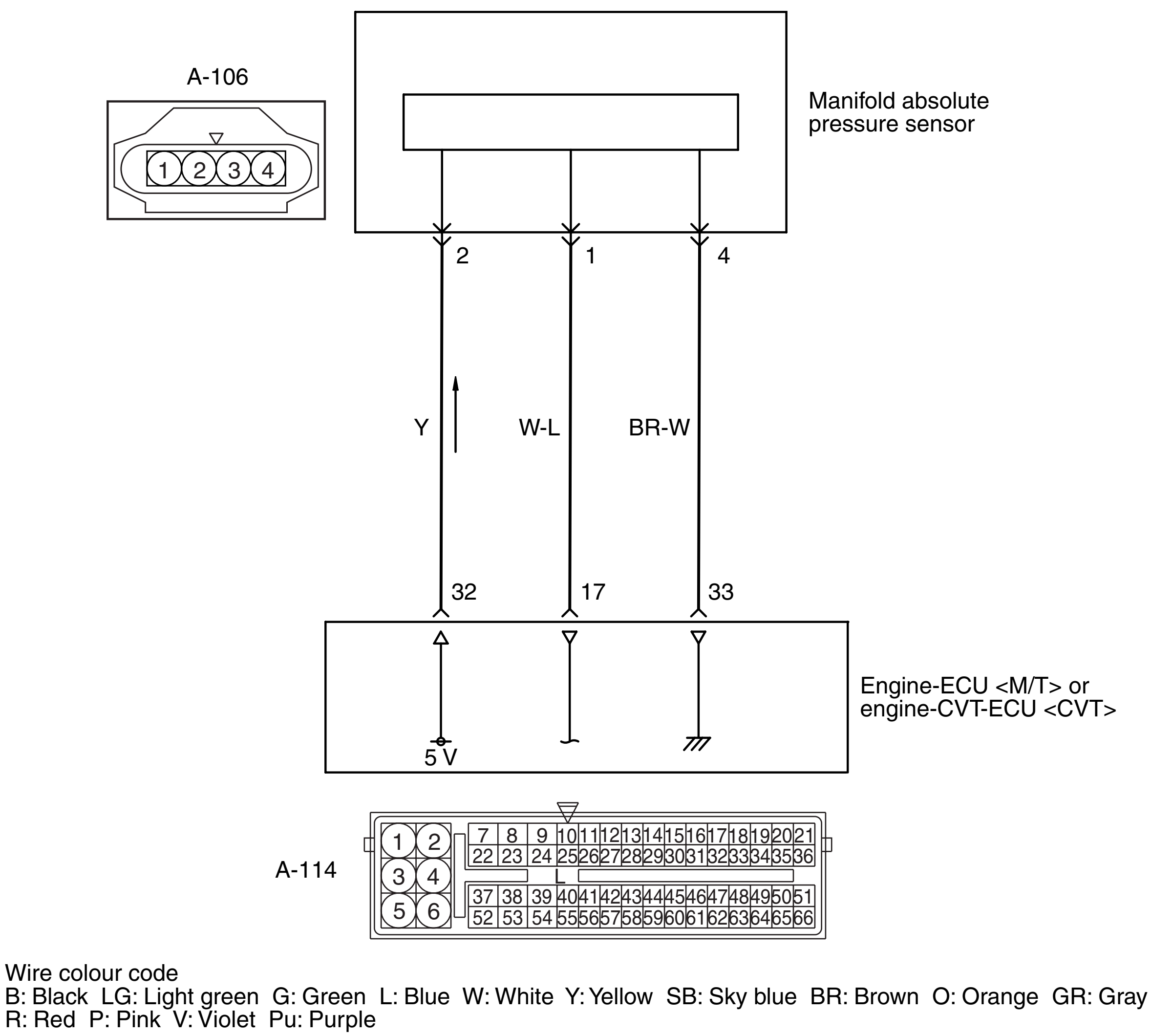
Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Intermittent malfunction (Refer to Group 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0105: Manifold Absolute Pressure Sensor System

Manifold Absolute Pressure Sensor Circuit



AK402676AC

OPERATION

- A power voltage of 5 V is applied to the manifold absolute pressure sensor power terminal (terminal No. 2) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 32) and earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 33) from the manifold absolute pressure sensor (terminal No. 4).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 17) from the manifold absolute pressure sensor output terminal (terminal No. 1).

FUNCTION

- The manifold absolute pressure sensor converts the manifold absolute pressure into a voltage signal and inputs the signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> corrects the fuel injection amount, etc.

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TROUBLE JUDGMENT

Check Condition

- 2 seconds later after the ignition switch has been in ON position or the engine has started up

Judgment Criterion

- The sensor output voltage is 4.7 V <M/T> or 4.5 V <CVT> or more (barometric pressure above 114 kPa or equivalent) for 4 seconds.

Check Conditions

- 2 seconds later after the ignition switch has been in ON position or the engine has started up.
- State of vehicle stop or throttle position sensor (main) output voltage is 1.3 V or more.

Judgment Criterion

- The sensor output voltage is 0.2 V or less (barometric pressure below 5 kPa or equivalent) for 4 seconds.

PROBABLE CAUSES

- Failed manifold absolute pressure sensor
- Open/short circuit in manifold absolute pressure sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

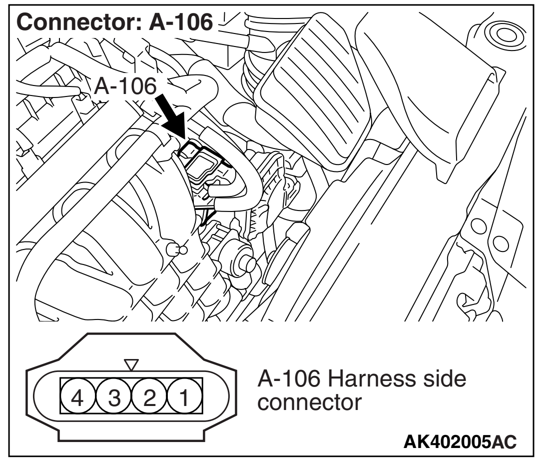
- Refer to Data List Reference Table P.13A-331.
  a. Item 32: Manifold absolute pressure sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-106 manifold absolute pressure sensor connector

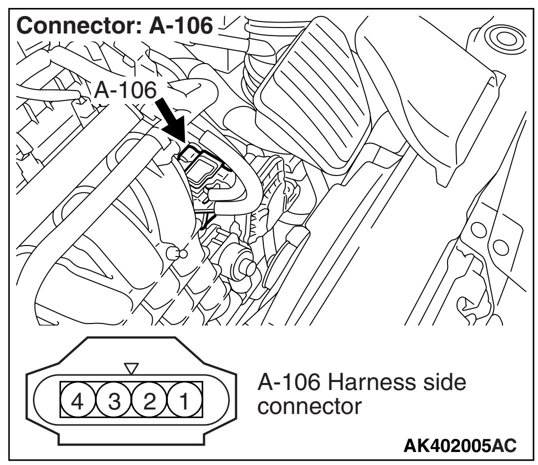


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at A-106 manifold absolute pressure sensor connector.



- Disconnect and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: 4.9 – 5.1 V

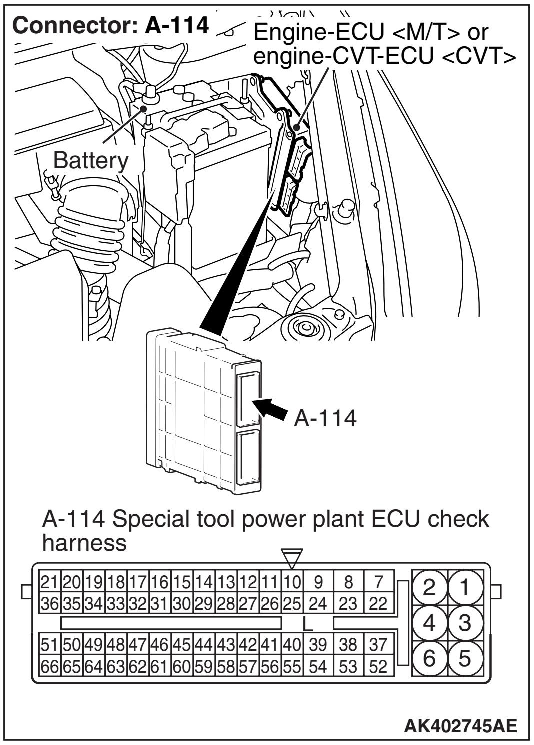
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 4 .

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STEP 4. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.

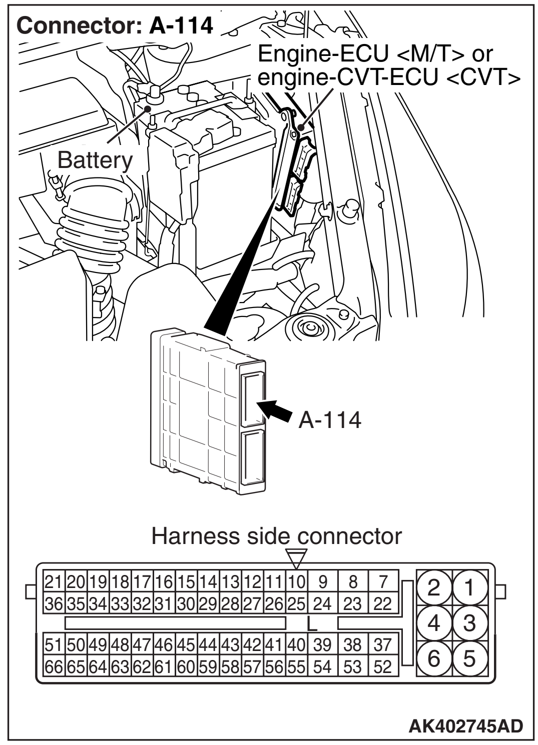


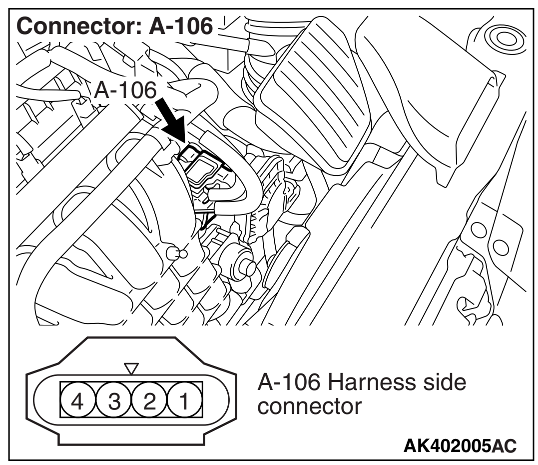
- Disconnect engine-ECU <M/T> or engine-CVT-ECU <CVT> connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Ignition switch: ON
- Voltage between terminal No. 32 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 6 .

STEP 5. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



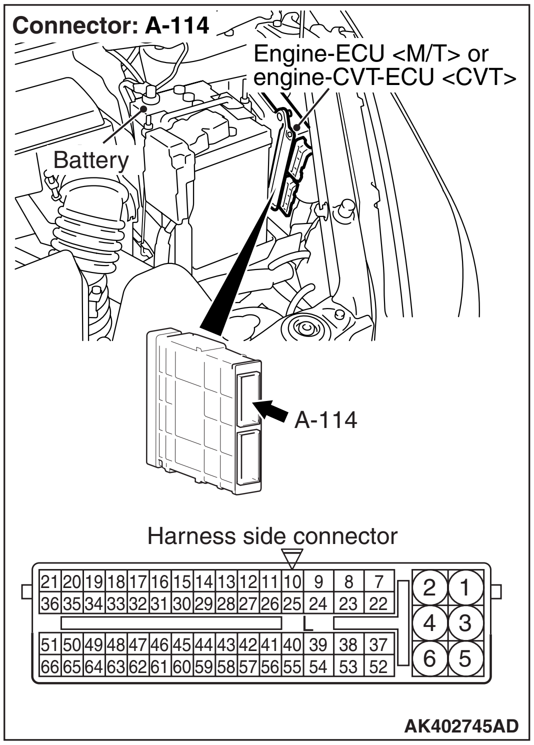


Q: Is the check result normal?
YES : Check and repair harness between A-106 (terminal No. 2) manifold absolute pressure sensor connector and A-114 (terminal No. 32) engine-ECU connector or engine-CVT-ECU connector.
- Check power supply line for open circuit.

NO : Repair or replace the connector.

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STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

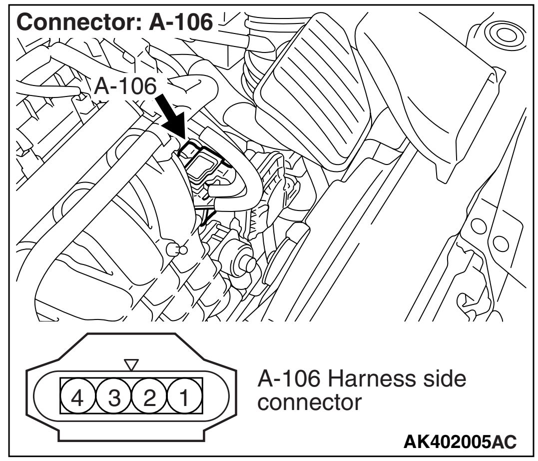


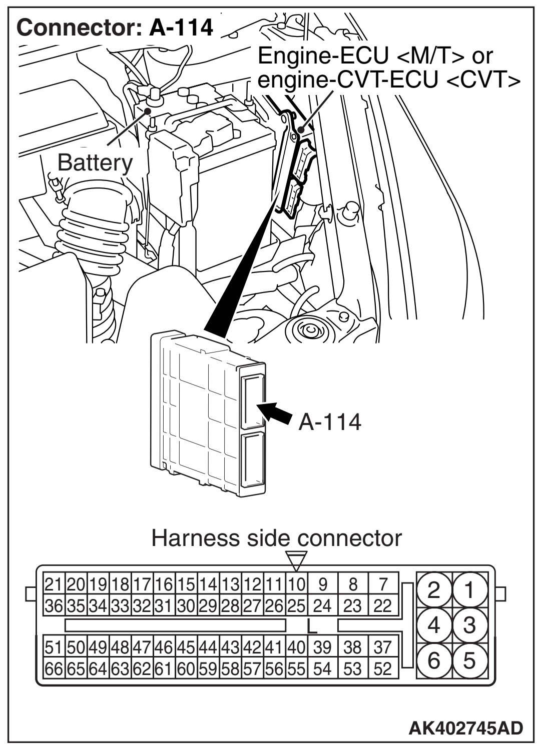
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between A-106 (terminal No. 2) manifold absolute pressure sensor connector and A-114 (terminal No. 32) engine-ECU connector or engine-CVT-ECU connector.





- Check power supply line for short circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

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STEP 8. M.U.T.-III data list

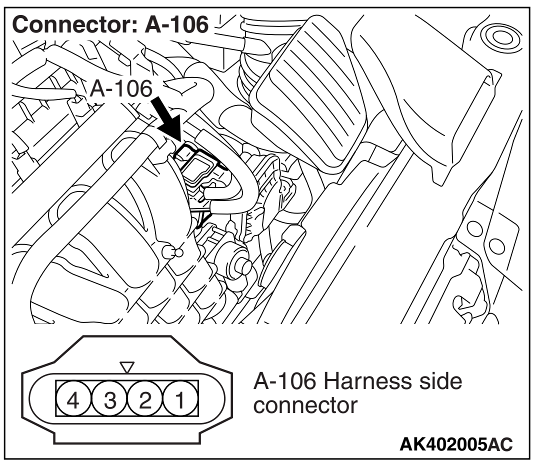
- Refer to Data List Reference Table P.13A-331.
  a. Item No. 32: Manifold absolute pressure sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 9. Perform resistance measurement at A-106 manifold absolute pressure sensor connector.



- Disconnect and measure at harness side.
- Resistance between terminal No. 4 and earth.

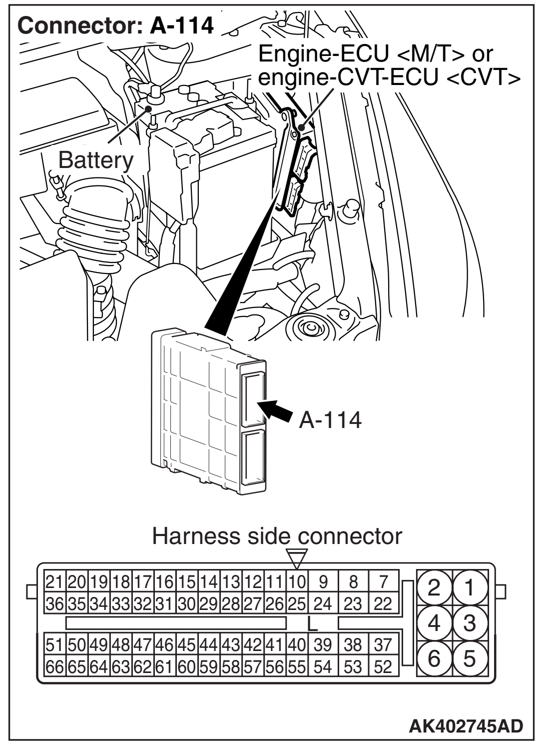
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

STEP 10. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



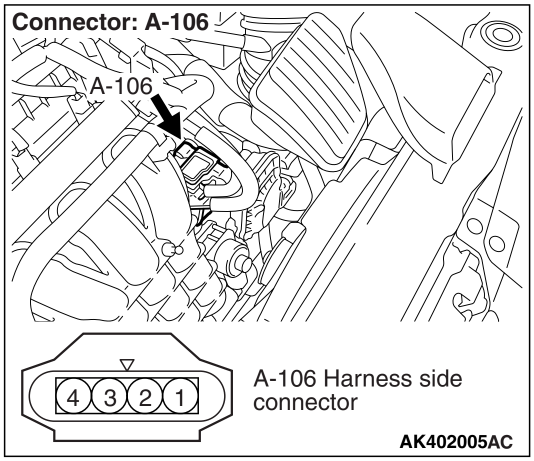
Q: Is the check result normal?

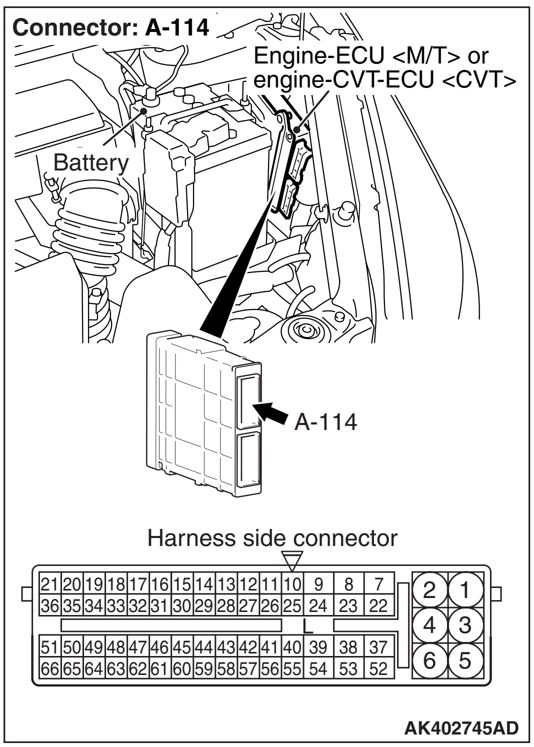
YES : Go to Step 11 .

NO : Repair or replace the connector.

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STEP 11. Check harness between A-106 (terminal No. 4) manifold absolute pressure sensor connector and A-114 (terminal No. 33) engine-ECU connector or engine-CVT-ECU connector.

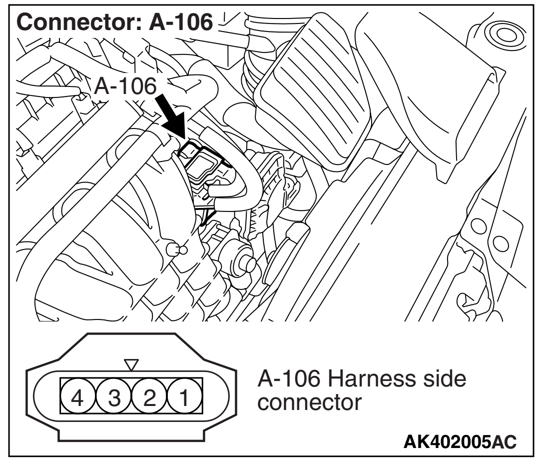




- Check earthing line for open circuit and damage.

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair the damaged harness wire.

STEP 12. Perform voltage measurement at A-106 manifold absolute pressure sensor connector.



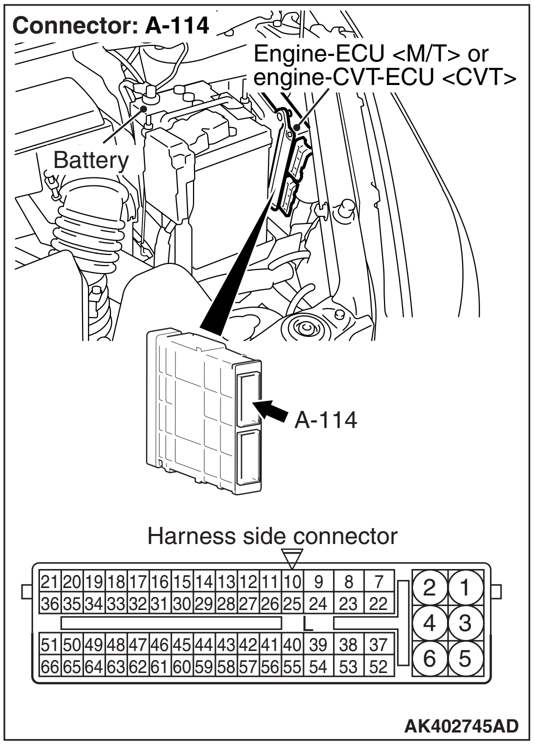
- Use special tool test harness (MB991709) to connect connector and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

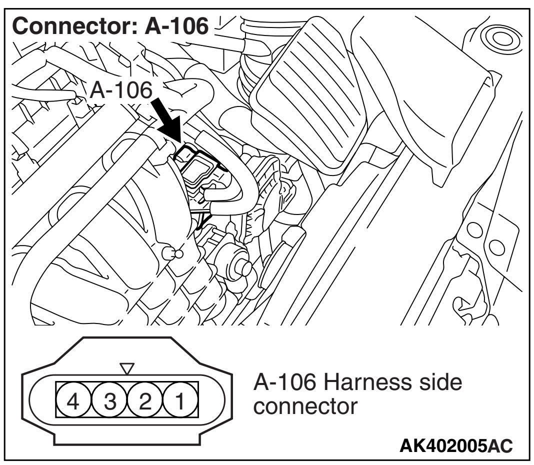
OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 14 .
NO : Go to Step 13 .

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STEP 13. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





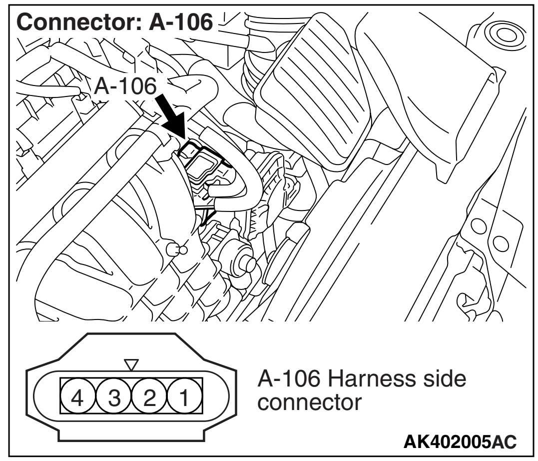
Q: Is the check result normal?

YES : Check and repair harness between A-106 (terminal No. 2) manifold absolute pressure sensor connector and A-114 (terminal No. 32) engine-ECU connector or engine-CVT-ECU connector.

- Check power supply line for damage.

NO : Repair or replace the connector.

STEP 14. Perform voltage measurement at A-106 manifold absolute pressure sensor connector.



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

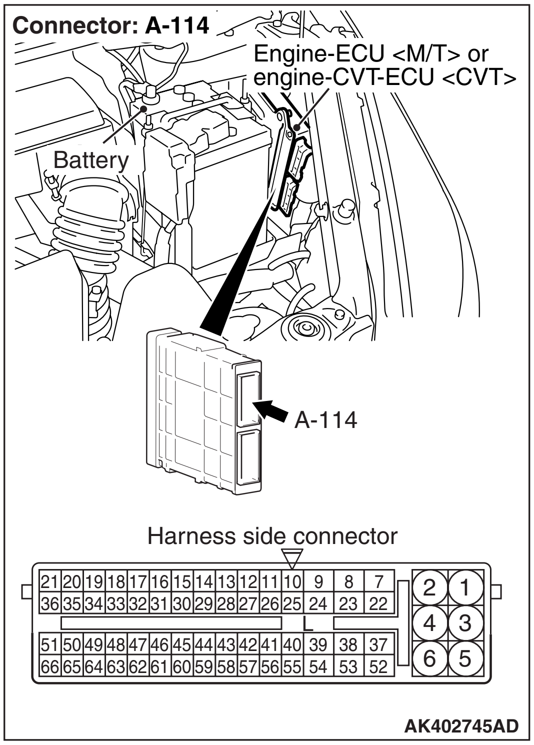
OK: 0.5 V or less

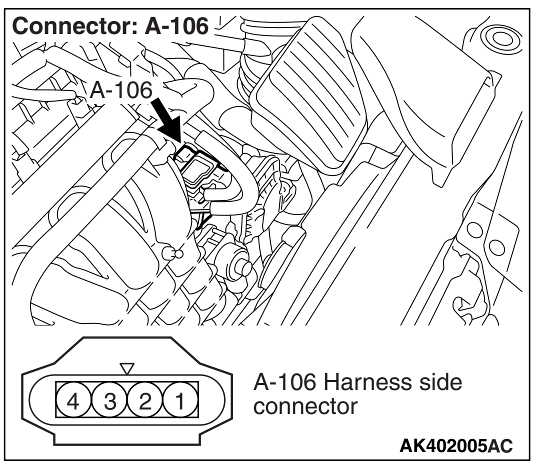
Q: Is the check result normal?

YES : Go to Step 16 .

NO : Go to Step 15 .

STEP 15. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





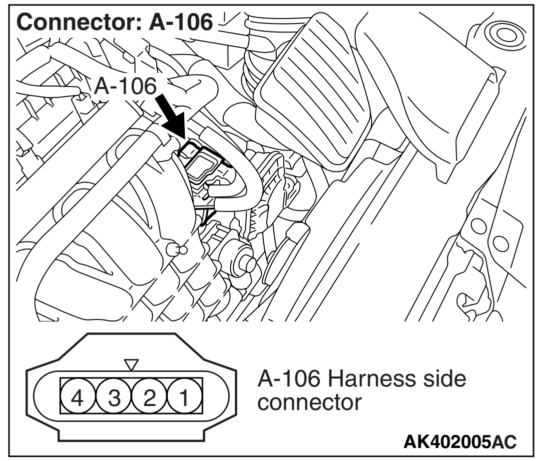
Q: Is the check result normal?

YES : Check and repair harness between A-106 (terminal No. 4) manifold absolute pressure sensor connector and A-114 (terminal No. 33) engine-ECU connector or engine-CVT-ECU connector.

- Check earthing line for damage.

NO : Repair or replace the connector.

STEP 16. Perform voltage measurement at A-106 manifold absolute pressure sensor connector.



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK:
Altitude 0m: 3.8 – 4.2 V
Altitude 600m: 3.5 – 3.9 V
Altitude 1,200m: 3.3 – 3.7 V
Altitude 1,800m: 3.0 – 3.4 V

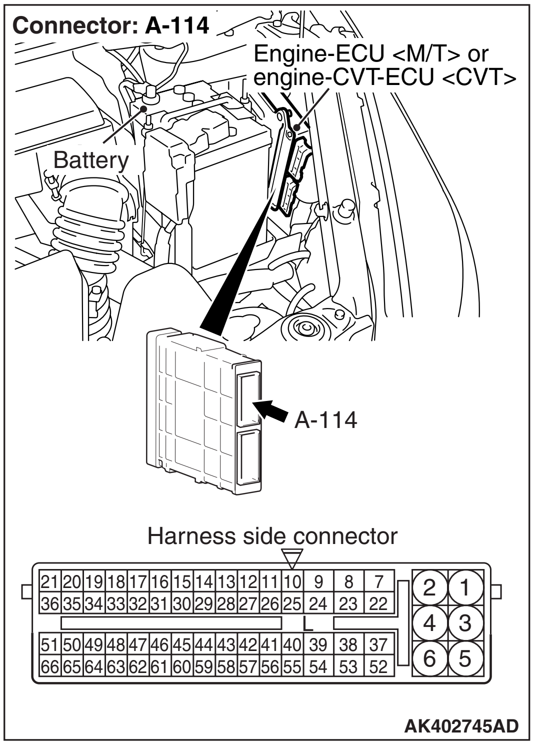
Q: Is the check result normal?

YES : Go to Step 19 .

NO : Go to Step 17 .

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STEP 17. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

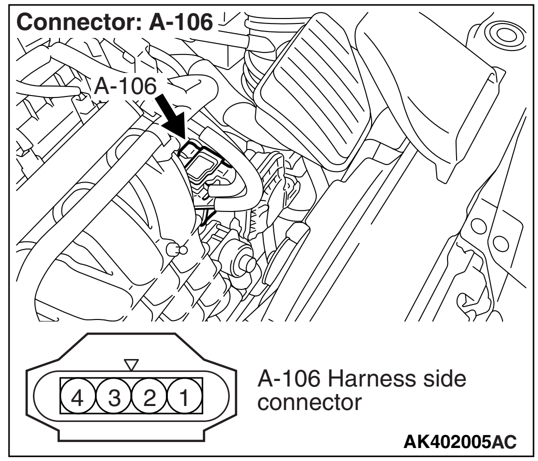


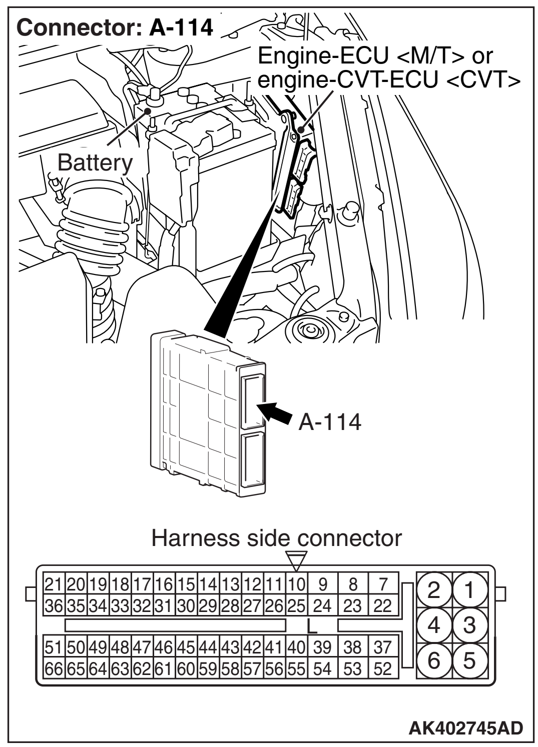
Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair or replace the connector.

STEP 18. Check harness between A-106 (terminal No. 1) manifold absolute pressure sensor connector and A-114 (terminal No. 17) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit and damage.

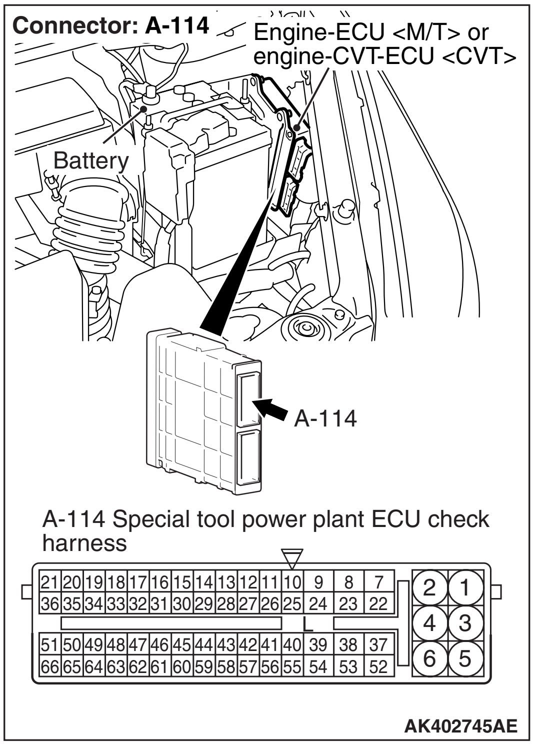
Q: Is the check result normal?

YES : Replace manifold absolute pressure sensor.

NO : Repair the damaged harness wire.

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STEP 19. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.

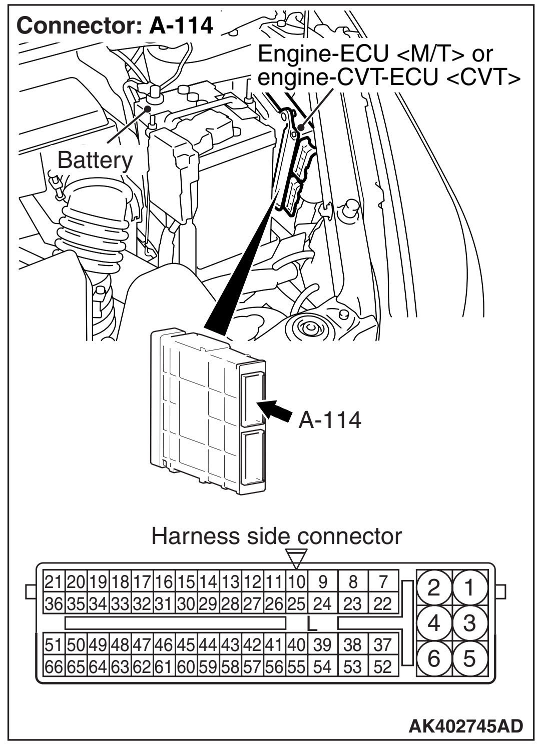


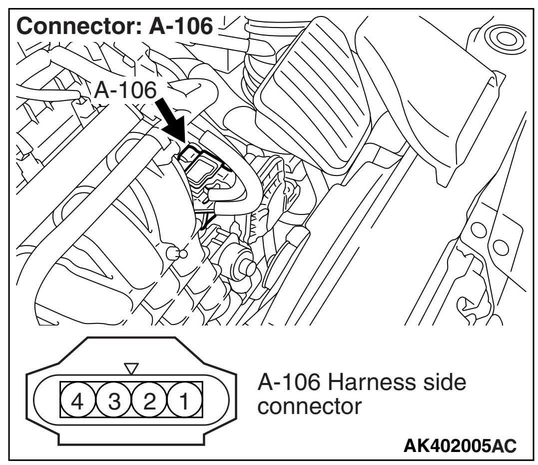
- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power tool plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Ignition switch: ON
- Voltage between terminal No. 17 and earth.

OK:
Altitude 0m: 3.8 – 4.2 V
Altitude 600m: 3.5 – 3.9 V
Altitude 1,200m: 3.3 – 3.7 V
Altitude 1,800m: 3.0 – 3.4 V

Q: Is the check result normal?
YES : Go to Step 21 .
NO : Go to Step 20 .

STEP 20. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



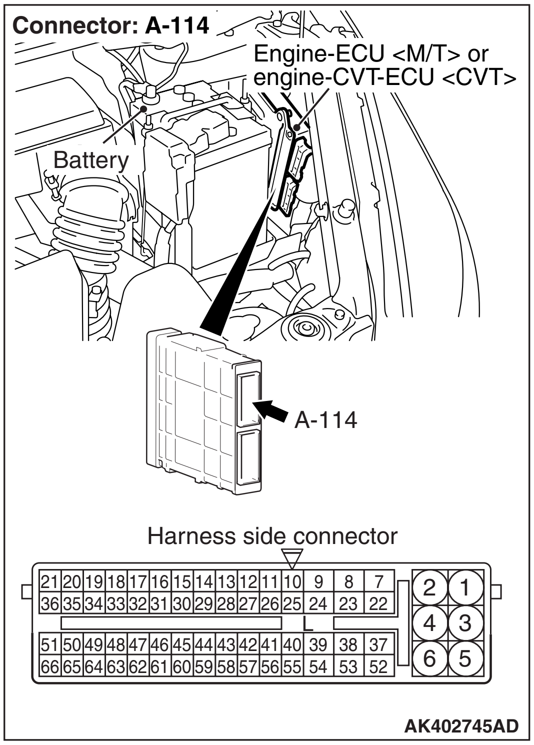


Q: Is the check result normal?
YES : Check and repair check harness between A-106 (terminal No. 1) manifold absolute pressure sensor connector and A-114 (terminal No. 17) engine-ECU connector or engine-CVT-ECU connector.
- Check output line for open circuit and damage.

NO : Repair or replace the connector.

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STEP 21. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



Q: Is the check result normal?

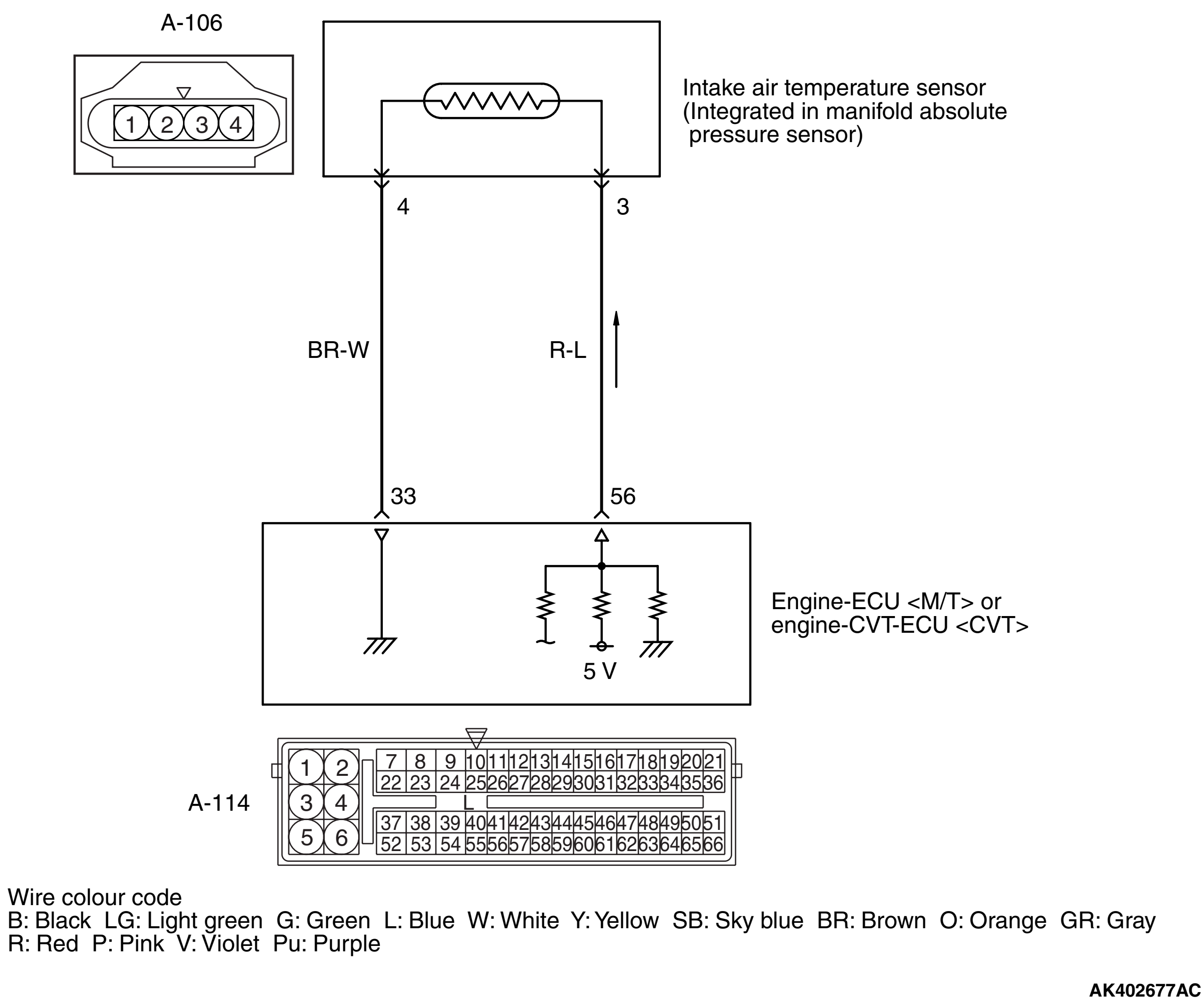
YES : Go to Step 8 .

NO : Repair or replace the connector.

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Code No. P0110: Intake Air Temperature Sensor System

Intake Air Temperature Sensor Circuit



OPERATION

- A power voltage of 5 V is applied to the intake air temperature sensor output terminal (terminal No. 3) of the intake air temperature sensor connector from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 56).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 33) from the intake air temperature sensor (terminal No. 4).

FUNCTION

- The intake air temperature sensor converts the intake air temperature into a voltage and inputs the voltage signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> corrects the fuel injection amount, etc.
- The intake air temperature sensor is a kind of resistor, which has characteristics to reduce its resistance as the intake air temperature rises. Therefore, the sensor output voltage varies with the intake air temperature, and becomes lower as the intake air temperature rises.

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TROUBLE JUDGMENT

Check Condition

- 2 seconds later after the ignition switch has been in ON position or the engine has started up.

Judgment Criteria

- The sensor output voltage is 4.6 V or more (intake air temperature of below –40°C or equivalent) for 4 seconds.

or

- The sensor output voltage is 0.1V or less (intake air temperature of above 140°C or equivalent) for 4 seconds.

PROBABLE CAUSES

- Failed intake air temperature sensor
- Open/short circuit in intake air temperature sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

- Item 13: Intake air temperature sensor

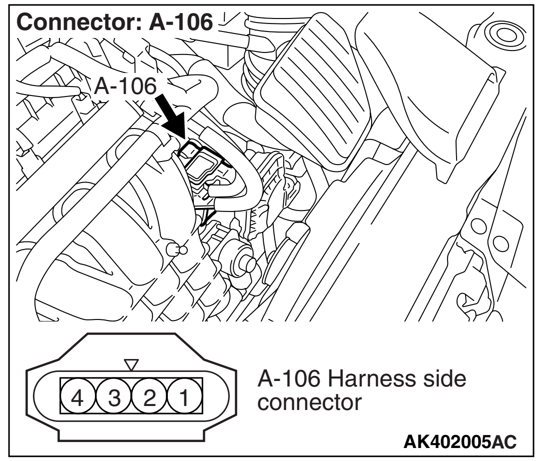
OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-106 intake air temperature sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check intake air temperature sensor itself.

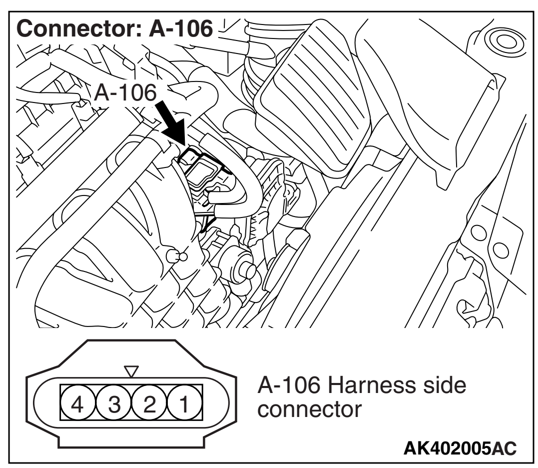
- Check intake air temperature sensor itself (Refer to P.13A-361).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace intake air temperature sensor.

STEP 4. Perform resistance measurement at A-106 intake air temperature sensor connector.



- Disconnect connector, and measure at harness side.
- Voltage between terminal No. 4 and earth.

OK: Continuity (2 Ω or less)

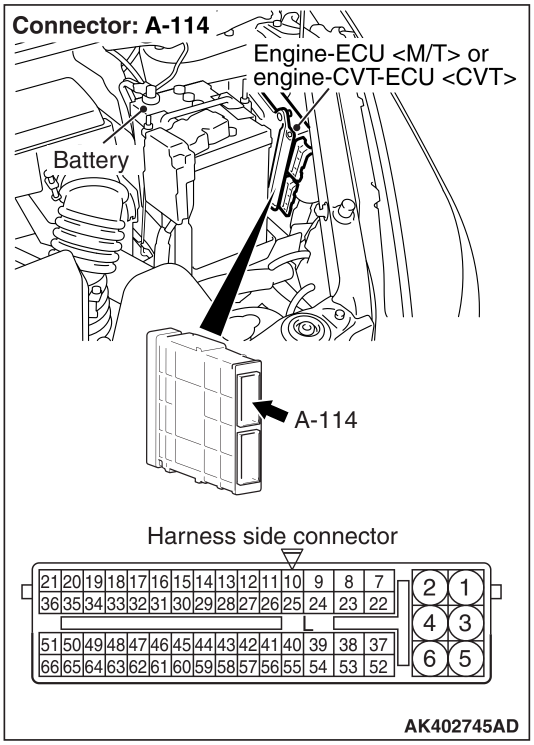
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

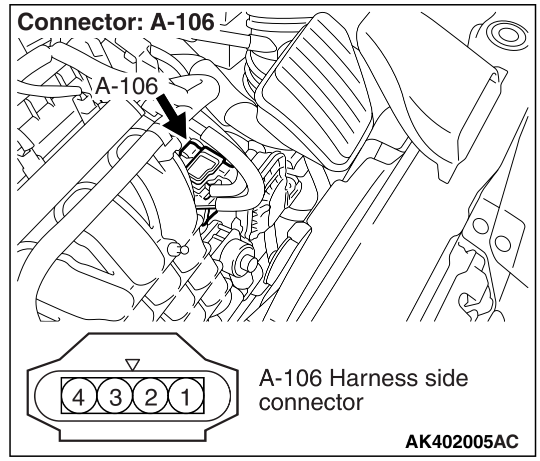
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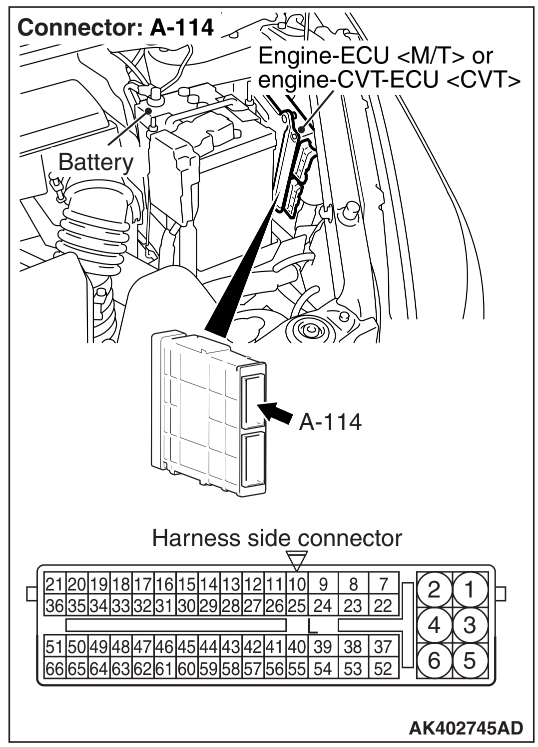
STEP 5. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair or replace the connector.

STEP 6. Check harness between A-106 (terminal No. 4) intake air temperature sensor connector and A-114 (terminal No. 33) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Repair the damaged harness wire.

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STEP 7. M.U.T.-III data list

- Item 13: Intake air temperature sensor

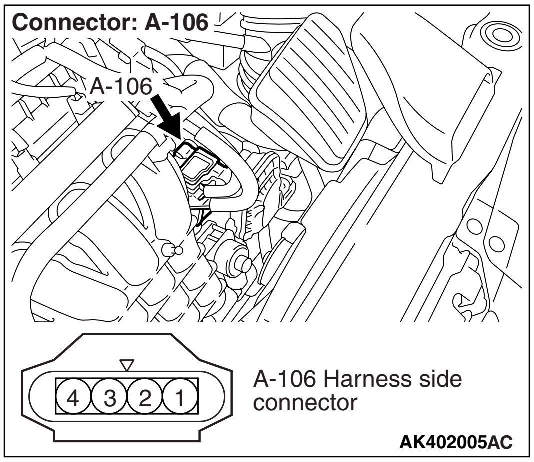
OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 8. Perform voltage measurement at A-106 intake air temperature sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

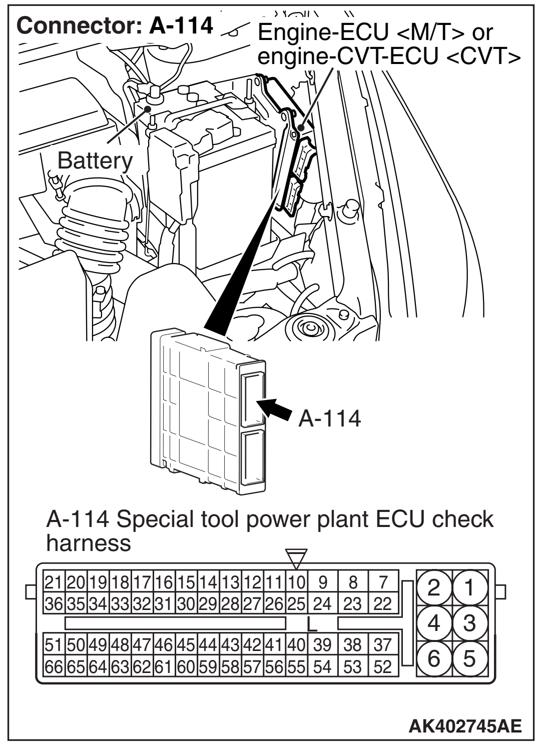
OK: 4.5 – 4.9 V

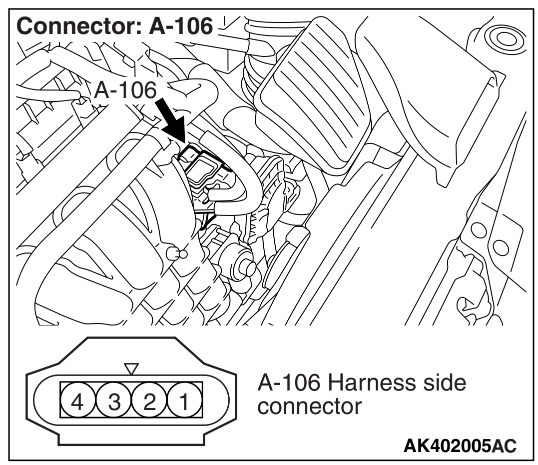
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 9 .

STEP 9. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.





- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Disconnect A-106 intake air temperature sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 56 and earth.

OK: 4.5 – 4.9 V

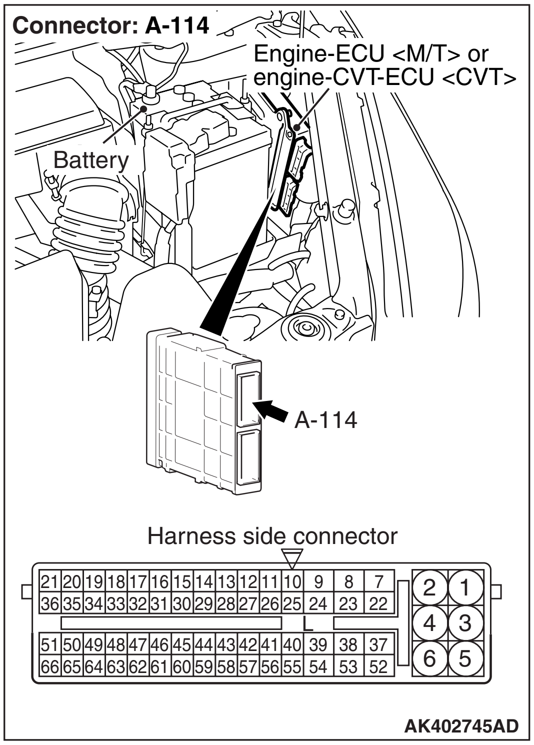
Q: Is the check result normal?

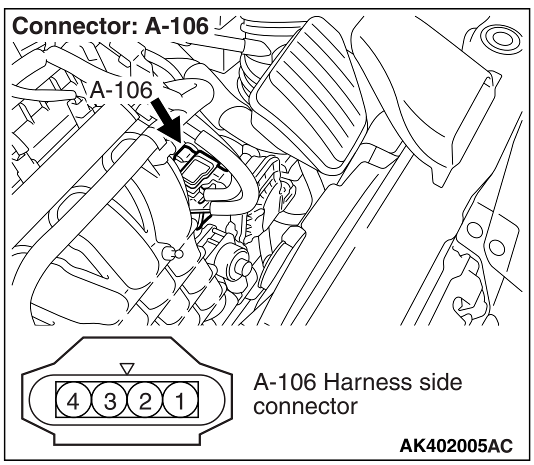
YES : Go to Step 10 .

NO : Go to Step 11 .

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STEP 10. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



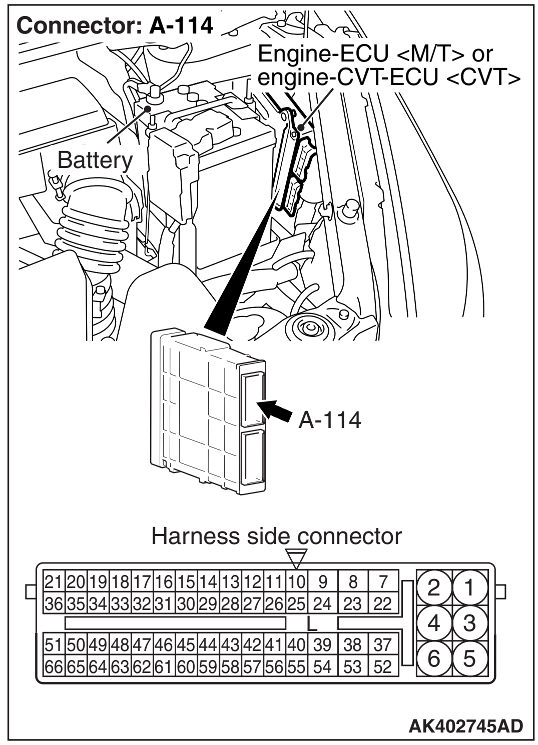


Q: Is the check result normal?

YES : Check and repair harness between A-106 (terminal No. 3) intake air temperature sensor connector and A-114 (terminal No. 56) engine-ECU connector or engine-CVT-ECU connector.
- Check output line for open circuit.

NO : Repair or replace the connector.

STEP 11. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



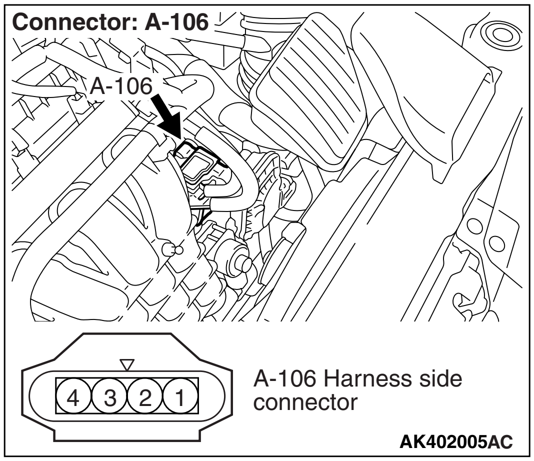
Q: Is the check result normal?

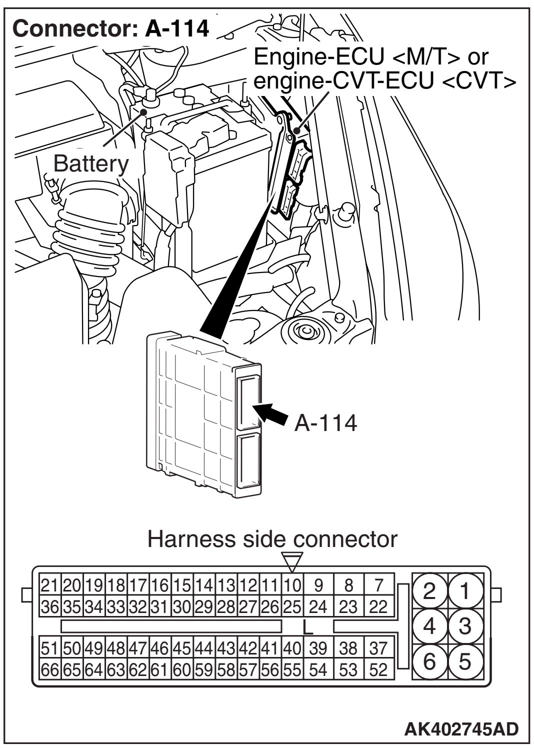
YES : Go to Step 12 .

NO : Repair or replace the connector.

STEP 12. Check harness between A-106 (terminal No. 3) intake air temperature sensor connector and A-114 (terminal No. 56) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for short circuit.



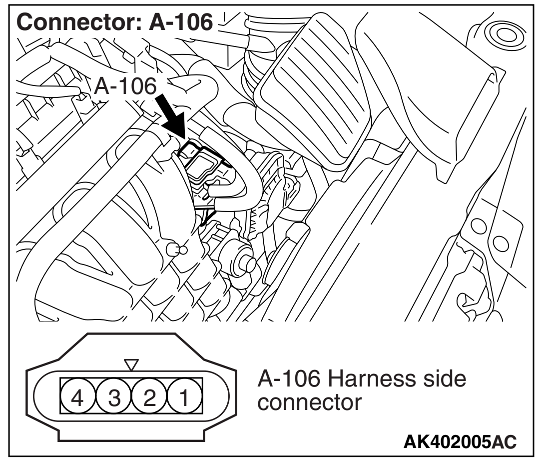


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair the damaged harness wire.

STEP 13. Perform voltage measurement at A-106 intake air temperature sensor connector.



- Use special tool test harness (MB991709) to connect only terminal No. 3 and No. 4, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK:

Ambient temperature at –20°C: 3.8 – 4.4 V
Ambient temperature at 0°C: 3.2 – 3.8 V
Ambient temperature at 20°C: 2.3 – 2.9 V
Ambient temperature at 40°C: 1.5 – 2.1 V
Ambient temperature at 60°C: 0.8 – 1.4 V
Ambient temperature at 80°C: 0.4 – 1.0 V

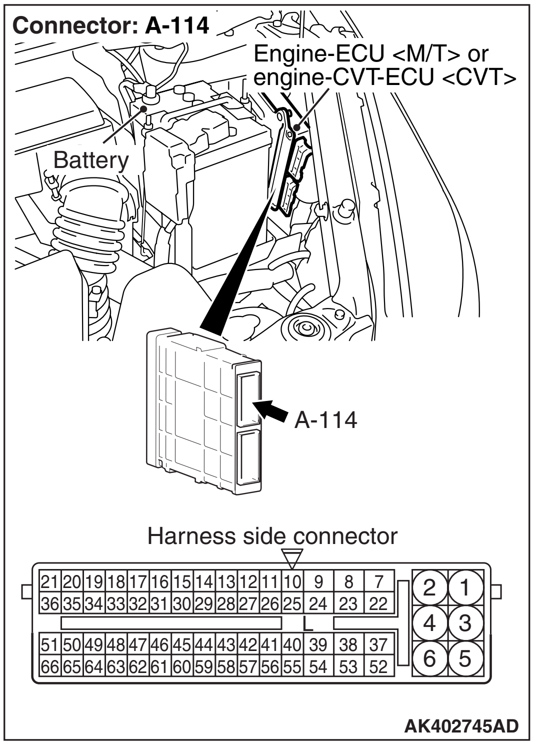
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 14 .

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STEP 14. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

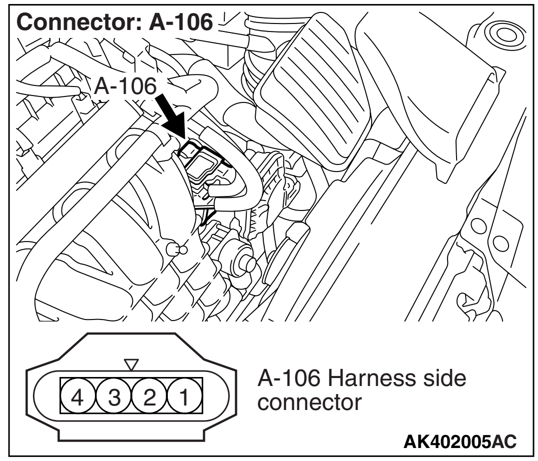


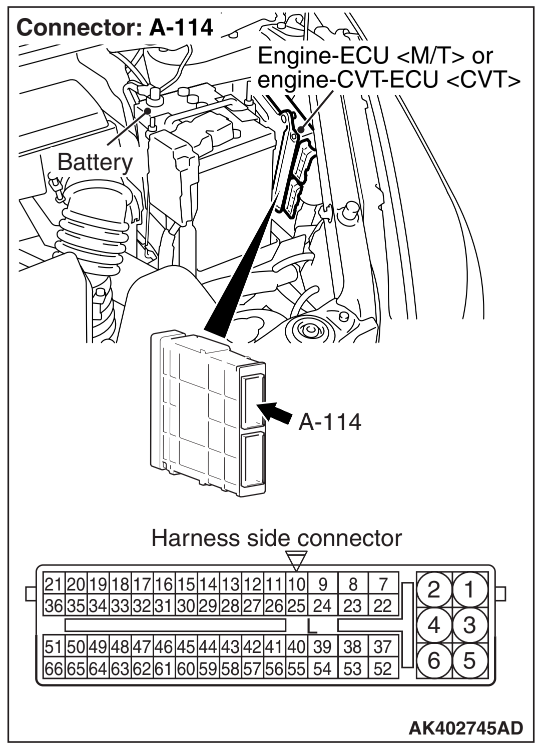
Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair or replace the connector.

STEP 15. Check harness between A-106 (terminal No. 3) intake air temperature sensor connector and A-114 (terminal No. 56) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

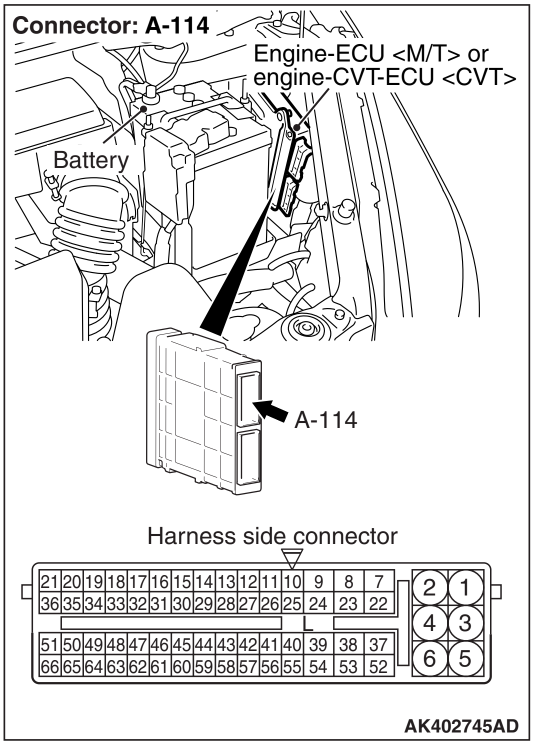
Q: Is the check result normal?

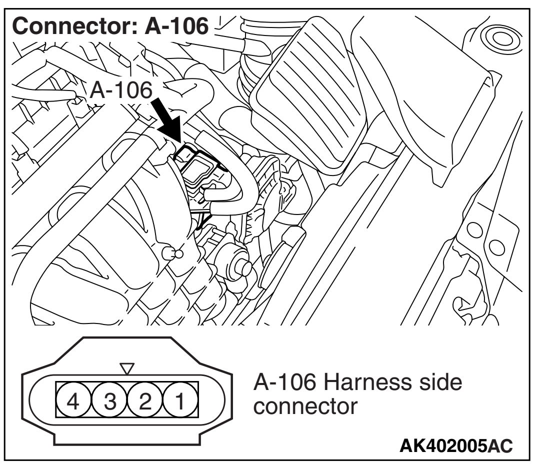
YES : Go to Step 16 .

NO : Repair the damaged harness wire.

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STEP 16. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector.





Q: Is the check result normal?

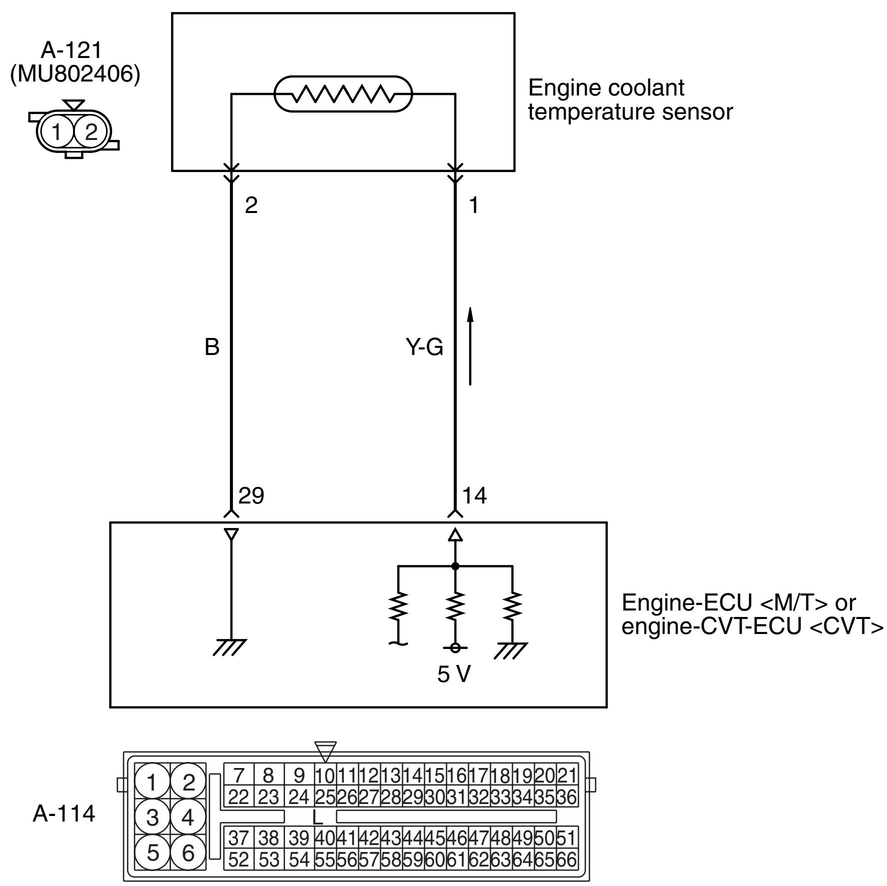
YES : Check harness between A-106 (terminal No. 4) intake air temperature sensor connector and A-114 (terminal No. 33) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for damage.

NO : Repair or replace the connector.

Code No. P0115: Engine Coolant Temperature Sensor System

Engine Coolant Temperature Sensor Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

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OPERATION

- A power voltage of 5 V is applied to the engine coolant temperature sensor output terminal (terminal No. 1) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 14).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 29) from the engine coolant temperature sensor (terminal No. 2).

FUNCTION

- The engine coolant temperature sensor converts the engine coolant temperature into a voltage signal, and inputs the voltage to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the fuel infection amount and the fast idle speed when the engine is cold state.
- The engine coolant temperature sensor is a kind of resistor, which has characteristics to reduce its resistance as the engine coolant temperature rises. Therefore, the sensor output voltage varies with the engine coolant temperature, and becomes lower as the engine coolant temperature rises.

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TROUBLE JUDGMENT

Check Condition

- 2 seconds later after the ignition switch has been in ON position or just after the engine has started up.

Judgment Criteria

- The sensor output voltage is 4.6 V or more (water temperature of below –40°C or equivalent) for 4 seconds.

or

- The sensor output voltage is 0.1 V or less (water temperature of above 120°C or equivalent) for 4 seconds.

Check Condition

- 2 seconds later after the engine has started up.

Judgment Criteria

- The sensor output voltage rises 1.6 V or more (engine coolant temperature below 40°C or equivalent) from 1.6 V or less (engine coolant temperature above 40°C or equivalent).
- For the following 5 minutes, the sensor output voltage should be 1.6 V or more (engine coolant temperature above 40°C or equivalent) <M/T>.

PROBABLE CAUSES

- Failed engine coolant temperature sensor
- Open/short circuit in engine coolant temperature sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

- Item 21: Engine coolant temperature sensor

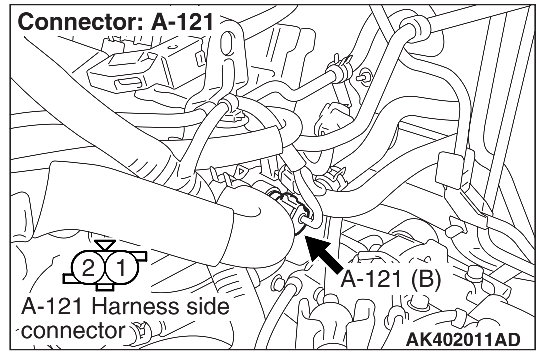
OK:
Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.
Engine hot state: At 80 – 120°C

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-121 engine coolant temperature sensor connector

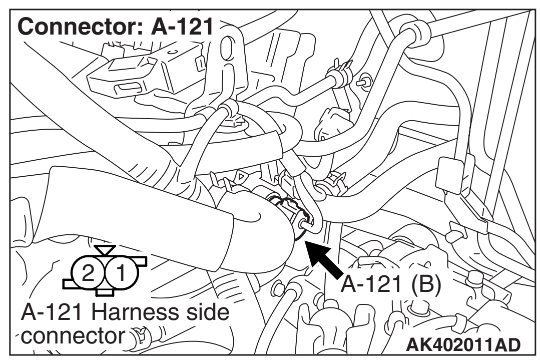


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-121 engine coolant temperature sensor connector.



- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 2.

OK:
Engine coolant temperature at –20°C: 14 – 17 kΩ
Engine coolant temperature at 0°C: 5.1 – 6.5 kΩ
Engine coolant temperature at 20°C: 2.1 – 2.7 kΩ
Engine coolant temperature at 40°C: 0.9 – 1.3 kΩ
Engine coolant temperature at 60°C: 0.48 – 0.68 kΩ
Engine coolant temperature at 80°C: 0.26 – 0.36 kΩ

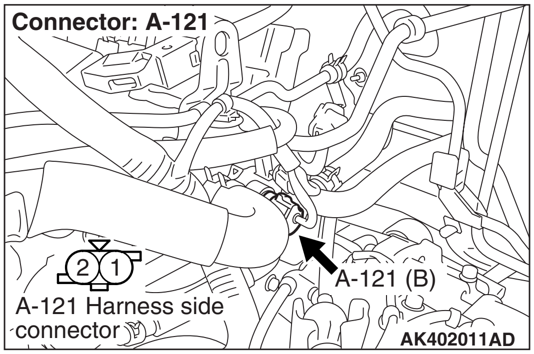
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace engine coolant temperature sensor.

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STEP 4. Perform voltage measurement at A-121 engine coolant temperature sensor connector.

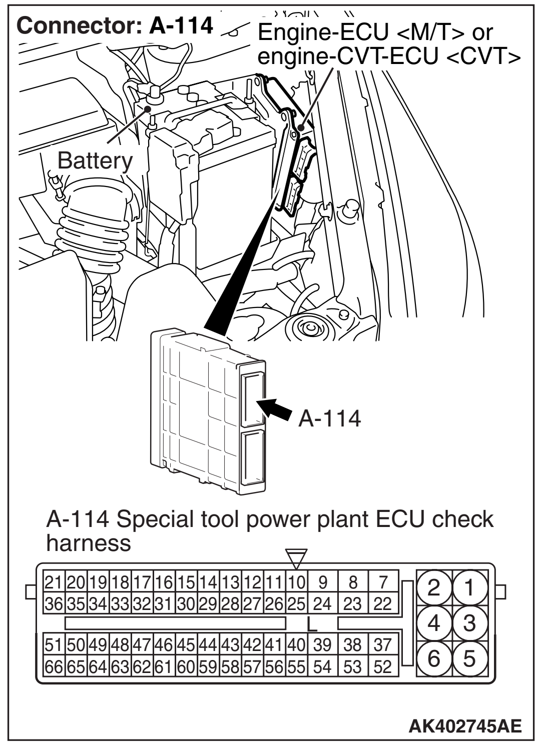


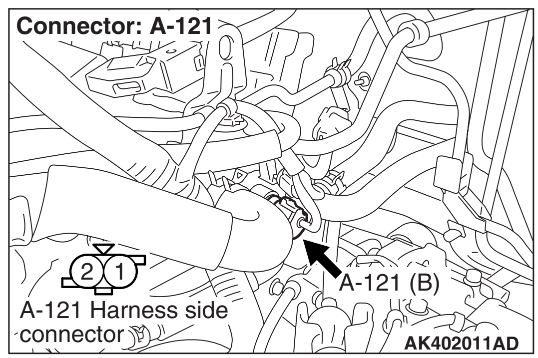
- Disconnect connector and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

  OK: 4.5 – 4.9 V

Q: Is the check result normal?
YES : Go to Step 10 .
NO : Go to Step 5 .

STEP 5. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



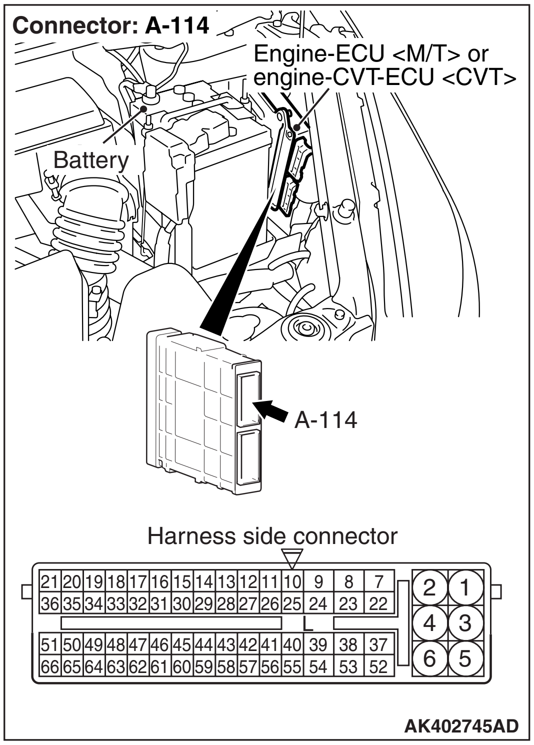


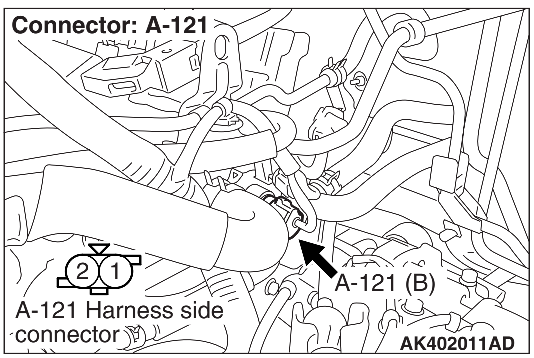
- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Disconnect A-121 engine coolant temperature sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 14 and earth.

  OK: 4.5 – 4.9 V

Q: Is the check result normal?
YES : Go to Step 6 .
NO : Go to Step 7 .

STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





Q: Is the check result normal?

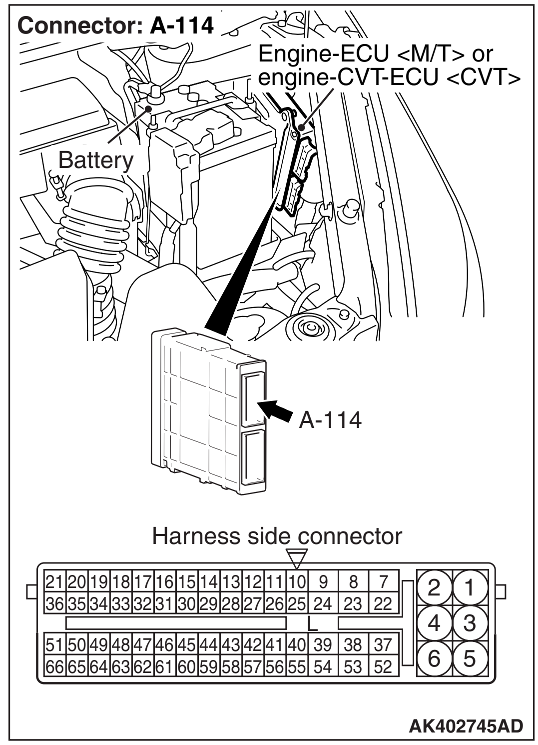
YES : Check and repair harness between A-121 (terminal No. 1) engine coolant temperature sensor connector and A-114 (terminal No. 14) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for open circuit.

NO : Repair or replace the connector.

STEP 7. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

Q: Is the check result normal?

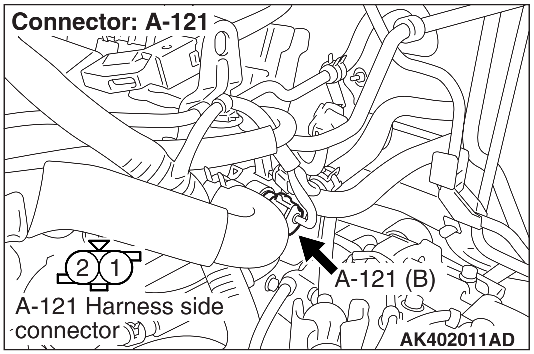


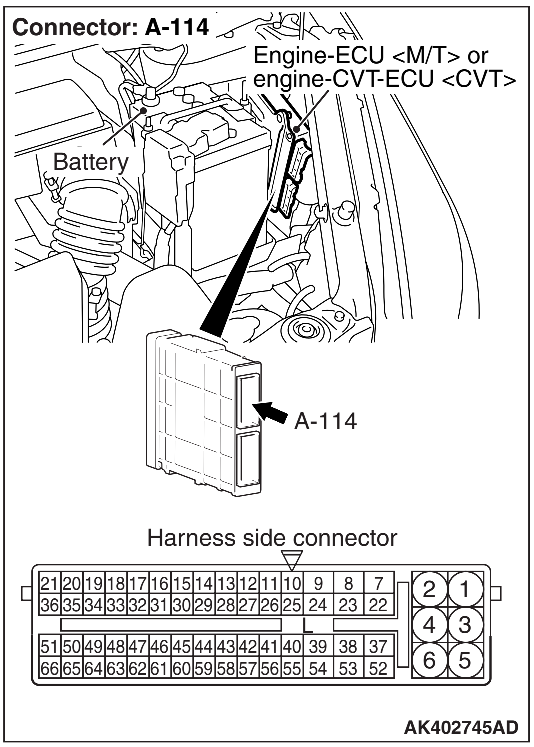
YES : Go to Step 8 .

NO : Repair or replace the connector.

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STEP 8. Check harness between A-121 (terminal No. 1) engine coolant temperature sensor connector and A-114 (terminal No. 14) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit.

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Repair the damaged harness wire.

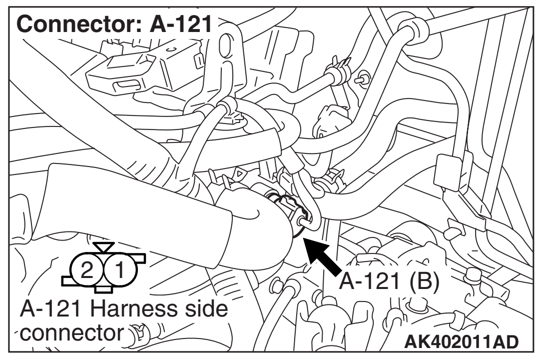
STEP 9. M.U.T.-III data list

- Item 21: Engine coolant temperature sensor

OK:
Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.
Engine hot state: At 80 – 120 °C

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 10. Perform resistance measurement at A-121 engine coolant temperature sensor connector.



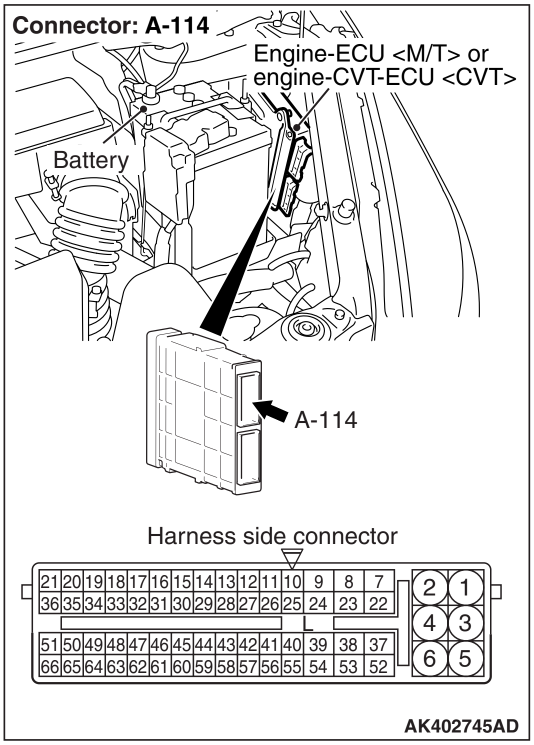
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?
YES : Go to Step 13 .
NO : Go to Step 11 .

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STEP 11. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

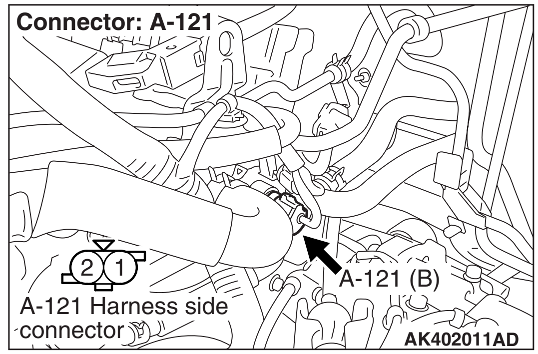


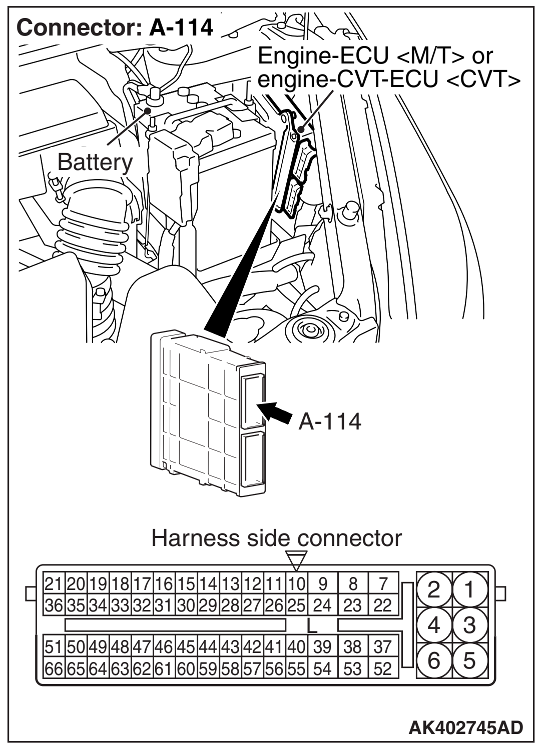
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace the connector.

STEP 12. Check harness between A-121 (terminal No. 2) engine coolant temperature sensor connector and A-114 (terminal No. 29) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

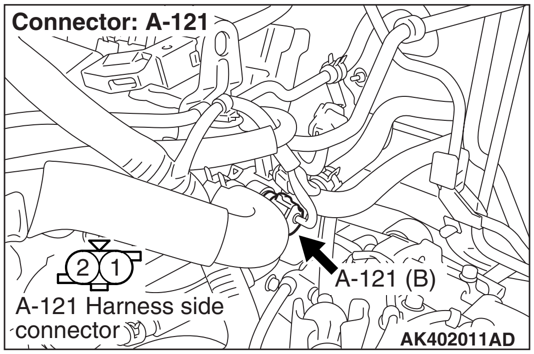
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

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STEP 13. Perform voltage measurement at A-121 engine coolant temperature sensor connector.

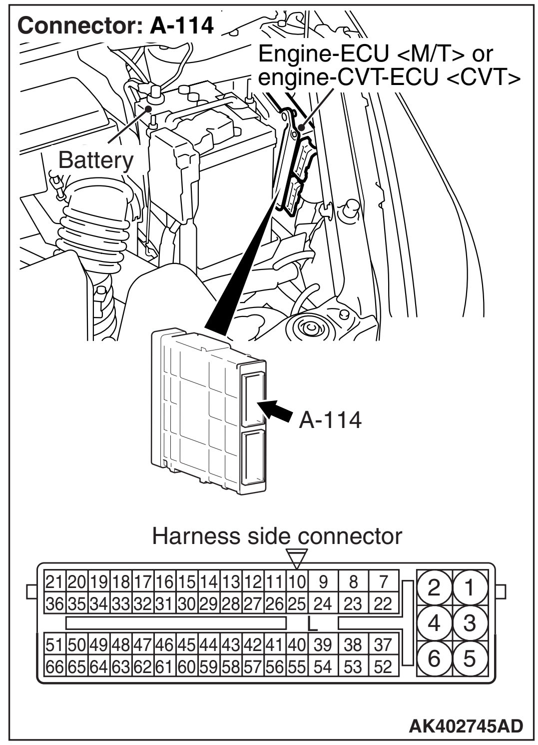


- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK:
Engine coolant temperature at −20°C: 3.9 − 4.5 V
Engine coolant temperature at 0°C: 3.2 − 3.8 V
Engine coolant temperature at 20°C: 2.3 − 2.9 V
Engine coolant temperature at 40°C: 1.3 − 1.9 V
Engine coolant temperature at 60°C: 0.7 − 1.3 V
Engine coolant temperature at 80°C: 0.3 − 0.9 V

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 14 .

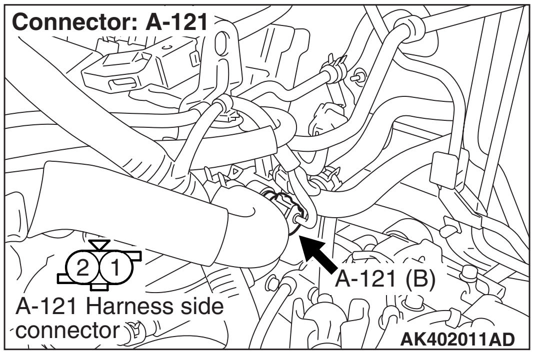
STEP 14. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

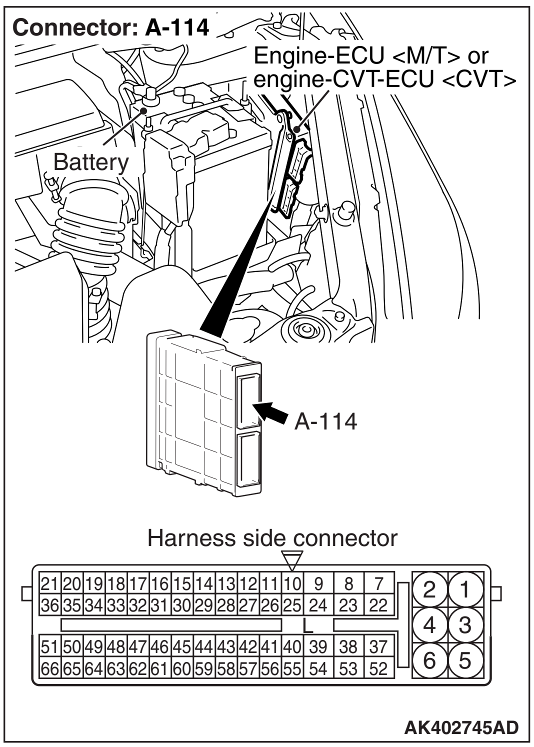


Q: Is the check result normal?
YES : Go to Step 15 .
NO : Repair or replace the connector.

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STEP 15. Check harness between A-121 (terminal No. 1) engine coolant temperature sensor connector and A-114 (terminal No. 14) engine-ECU connector or engine-CVT-ECU connector.

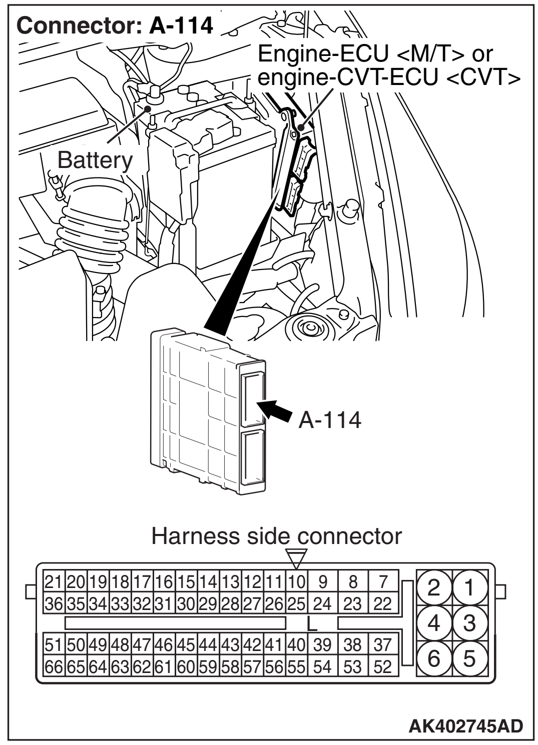


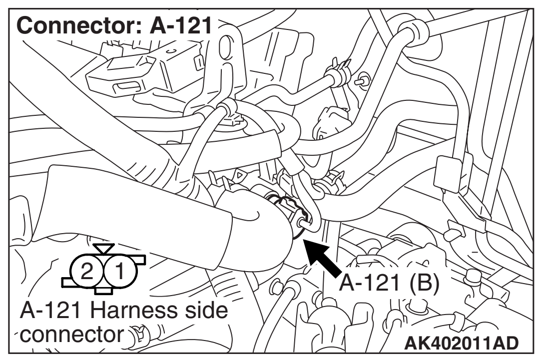


- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 16 .
NO : Repair the damaged harness wire.

STEP 16. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



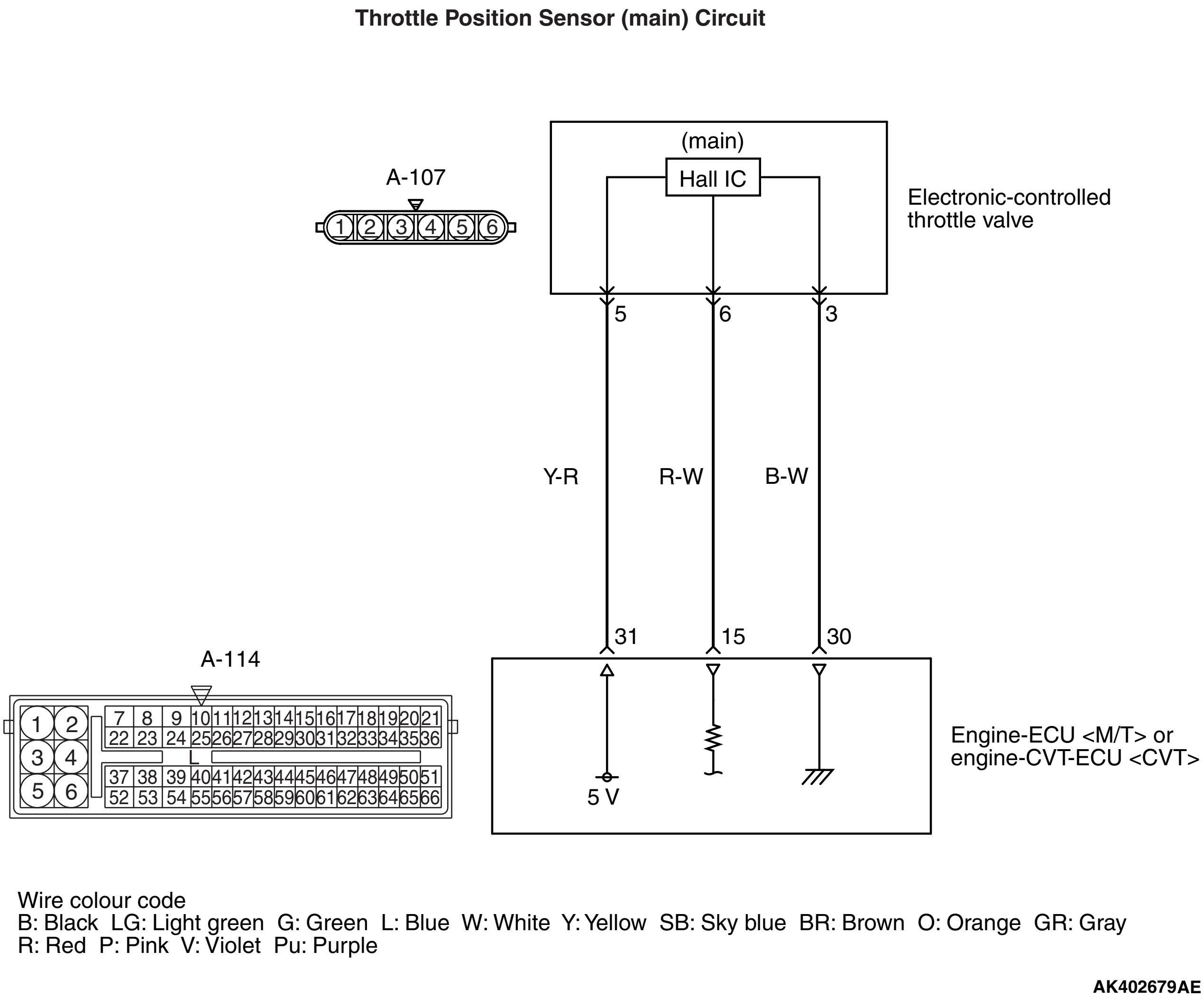


Q: Is the check result normal?
YES : Check and repair harness between A-121 (terminal No. 2) engine coolant temperature sensor connector and A-114 (terminal No. 29) engine-ECU connector or engine-CVT-ECU connector.
- Check earthing line for damage.

NO : Repair or replace the connector.

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Code No. P0122: Throttle Position Sensor (Main) Circuit Low Input



OPERATION

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 31).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 30) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 15) from the electronic-controlled throttle valve output terminal (terminal No. 6).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the throttle valve position.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Throttle position sensor (main) output voltage is 0.2 V or less <M/T>.
- Throttle position sensor (main) output voltage is 0.2 V or less for 0.5 second <CVT>.

PROBABLE CAUSES

- Failed throttle position sensor (main)
- Open/short circuit in throttle position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

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DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

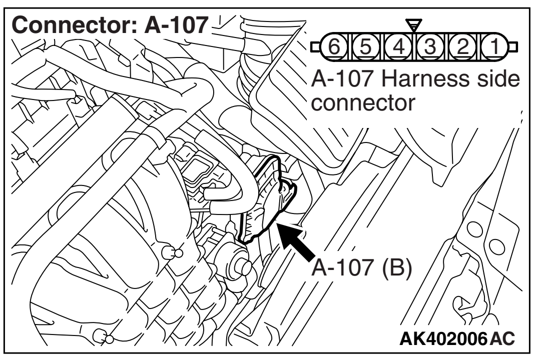
- Refer to Data List Reference Table P.13A-331.
  a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-107 electronic-controlled throttle valve connector

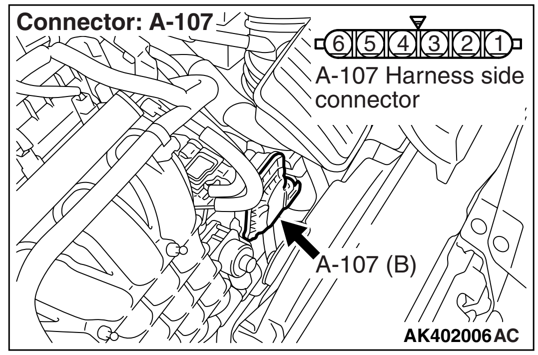


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at A-107 electronic-controlled throttle valve connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 5 and earth.

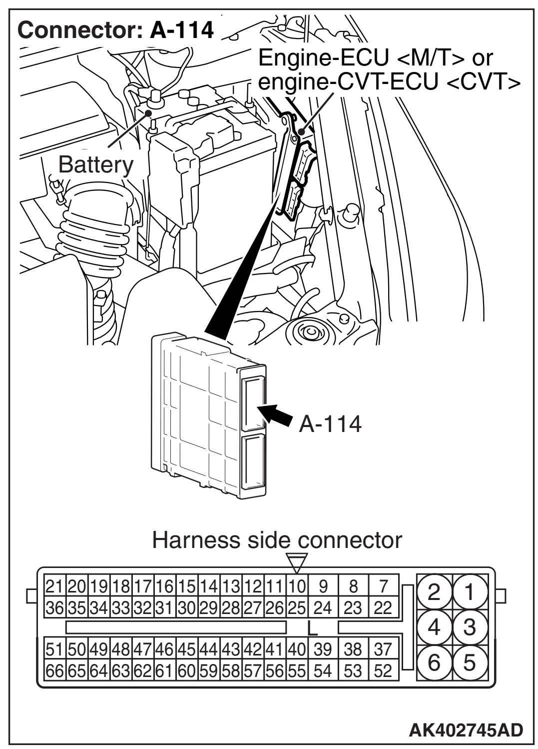
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



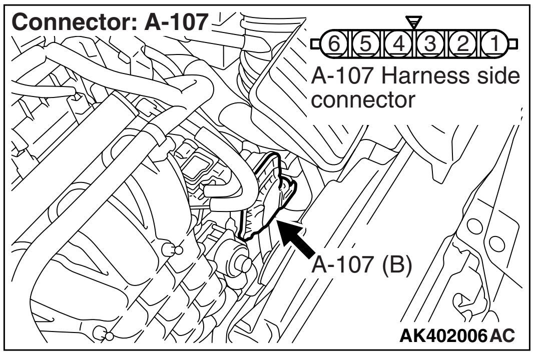
Q: Is the check result normal?

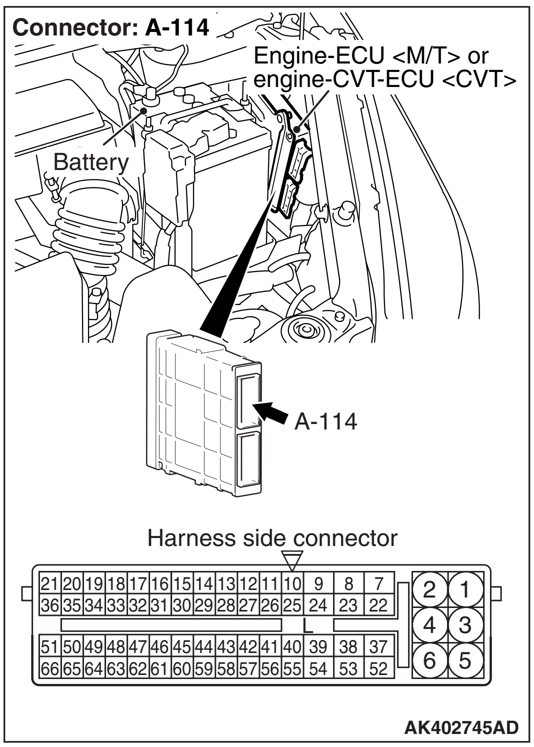
YES : Go to Step 5 .

NO : Repair or replace the connector.

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STEP 5. Check harness between A-107 (terminal No. 5) electronic-controlled throttle valve connector and A-114 (terminal No. 31) engine-ECU connector or engine-CVT-ECU connector.





- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

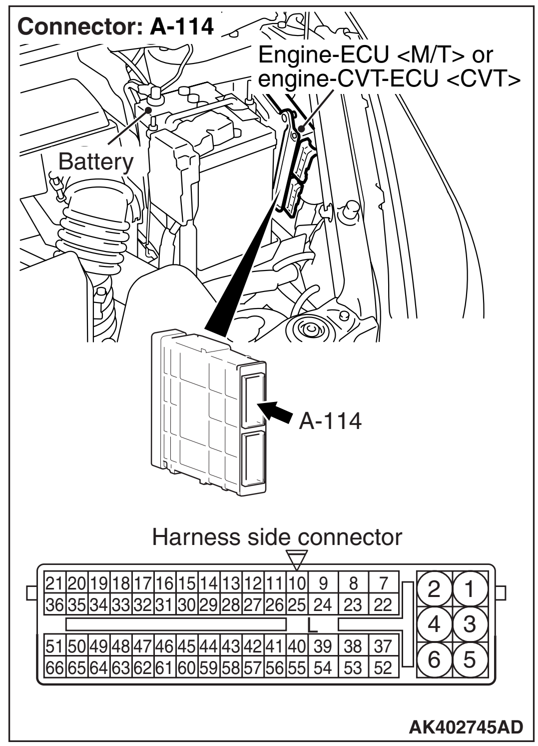
- Refer to Data List Reference Table P.13A-331.
  a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



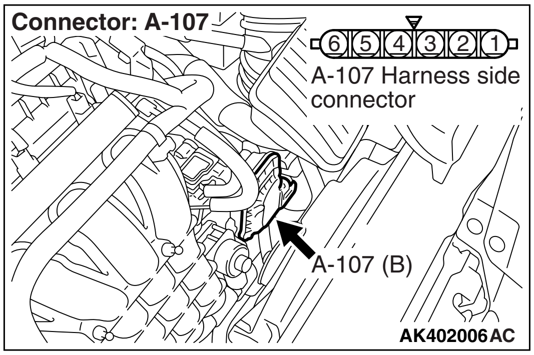
Q: Is the check result normal?

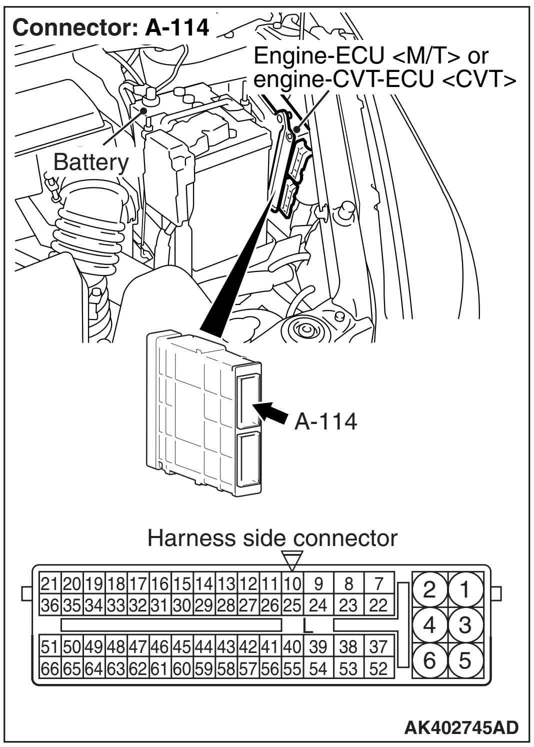
YES : Go to Step 8 .

NO : Repair or replace the connector.

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STEP 8. Check harness between A-107 (terminal No. 5) electronic-controlled throttle valve connector and A-114 (terminal No. 31) engine-ECU connector or engine-CVT-ECU connector.





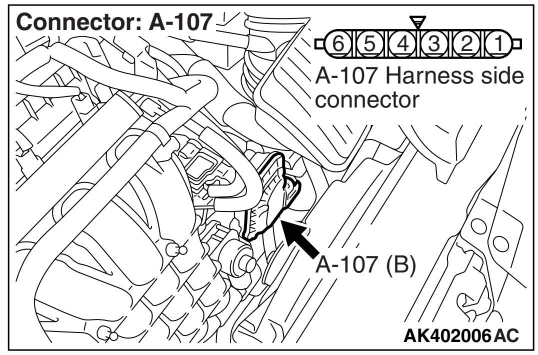
- Check power supply line for damage.

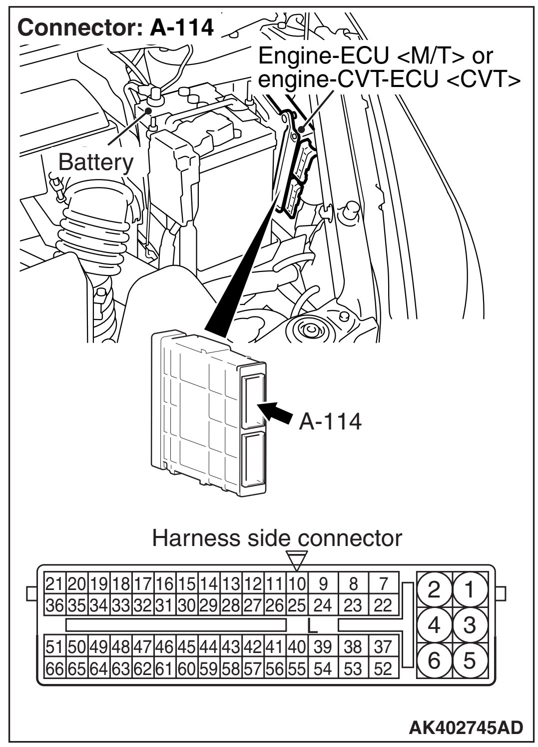
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Check harness between A-107 (terminal No. 6) electronic-controlled throttle valve connector and A-114 (terminal No. 15) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

STEP 10. Replace the throttle body assembly

- After replacing the throttle body assembly re-check the trouble symptoms.

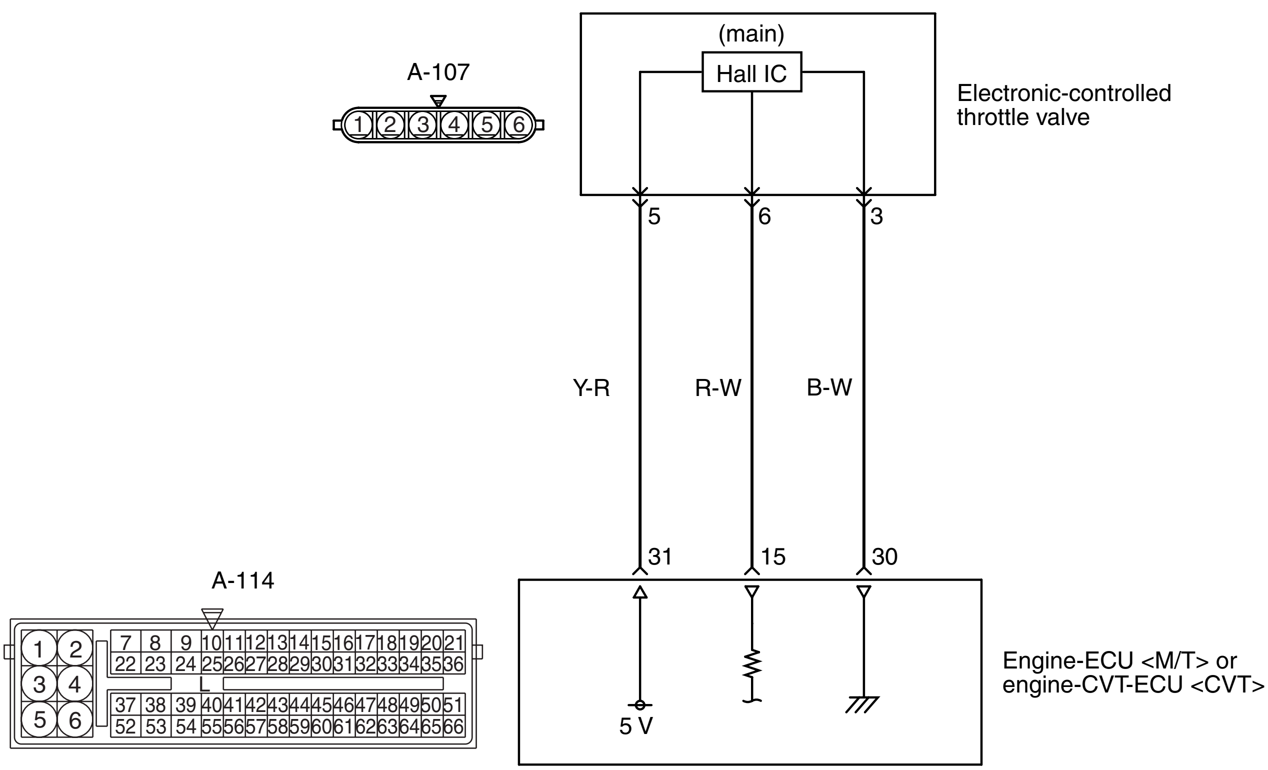
Q: Is the check result normal?

YES : Check end.

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

Code No. P0123: Throttle Position Sensor (Main) Circuit High Input

Throttle Position Sensor (main) Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402679AE

OPERATION

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 31).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 30) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 15) from the electronic-controlled throttle valve output terminal (terminal No. 6).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the throttle valve position.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Throttle position sensor (main) output voltage is 4.8 V or more <M/T>.
- Throttle position sensor (main) output voltage is 4.8 V or more for 0.5 second <CVT>.

PROBABLE CAUSES

- Failed throttle position sensor (main)
- Open/short circuit in throttle position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

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DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

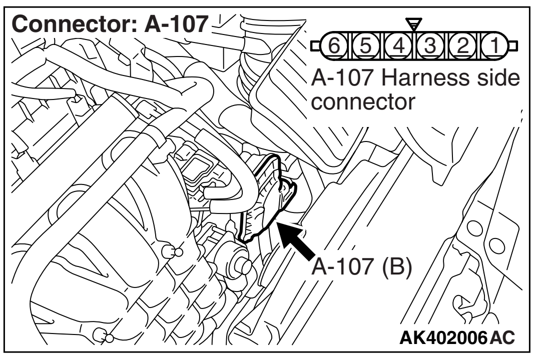
- Refer to Data List Reference Table P.13A-331.
  a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-107 electronic-controlled throttle valve connector

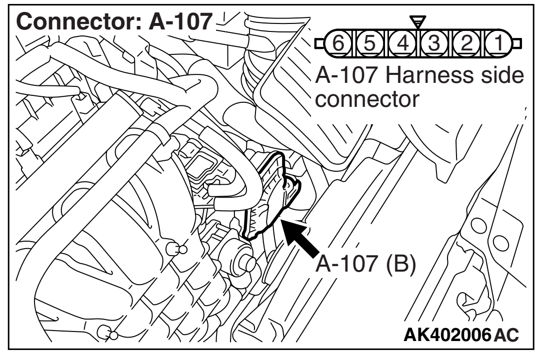


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-107 electronic-controlled throttle valve connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 3 and earth.

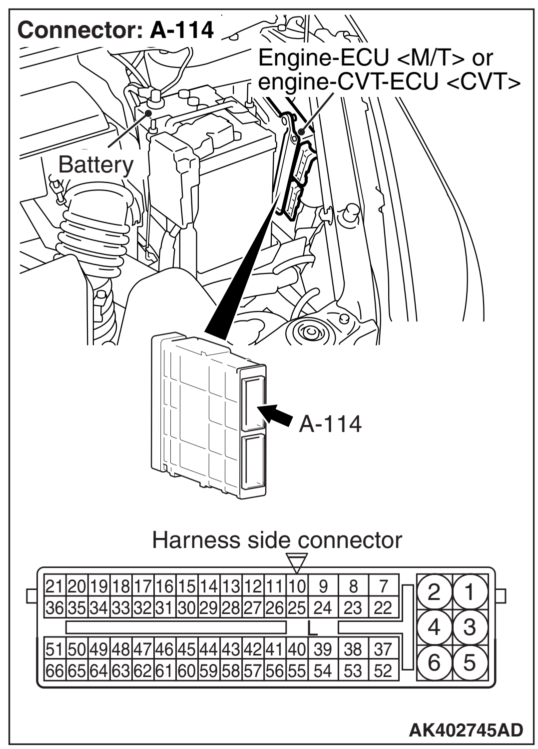
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



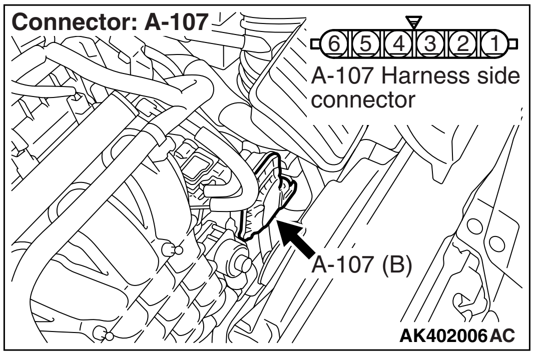
Q: Is the check result normal?

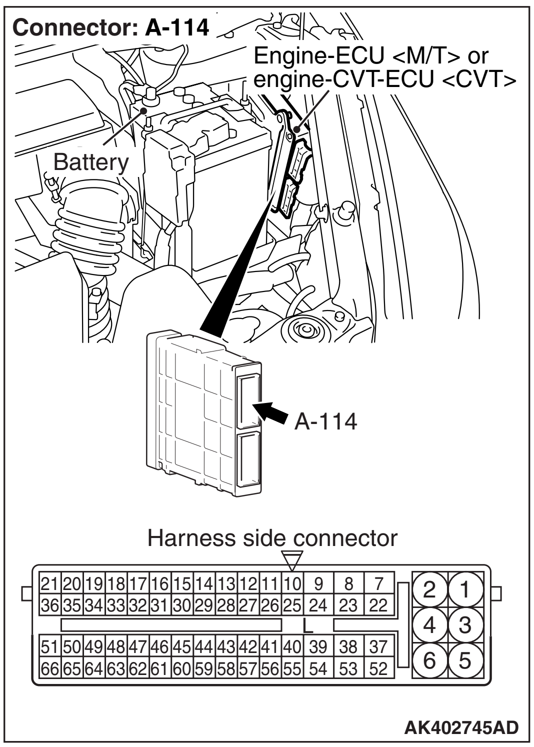
YES : Go to Step 5 .

NO : Repair or replace the connector.

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STEP 5. Check harness between A-107 (terminal No. 3) electronic-controlled throttle valve connector and A-114 (terminal No. 30) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Replace the throttle body assembly

- After replacing the throttle body assembly, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P0125: Feedback System Monitor

OPERATION

- Refer to Code No. P0201 No. 1 Injector System P.13A-89.
Refer to Code No. P0202 No. 2 Injector System P.13A-94.
Refer to Code No. P0203 No. 3 Injector System P.13A-99.
Refer to Code No. P0204 No. 4 Injector System P.13A-104.
- Refer to Code No. P0130 Oxygen Sensor (Front) Circuit P.13A-62.

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> effects air-fuel ratio feedback control in accordance with the signals from the oxygen sensor (front).
- If the oxygen sensor (front) has deteriorated, corrections will be made by the oxygen sensor (rear).
- Diagnosis code P0125 becomes stored in memory if a failure is detected in the above air/fuel ratio feedback control system.

TROUBLE JUDGMENT

Check Conditions

- Above 30 seconds later after the engine has started up <M/T>.
- The engine coolant temperature approximately. 82°C or more.
- Within the range of air-fuel ratio feedback operation.
- Not in low speed operation.

Judgment Criterion

- The oxygen sensor output voltage is not deviated from 0.5 V for 30 seconds.

PROBABLE CAUSES

- Failed oxygen sensor (front)
- Harness damage in oxygen sensor (front) circuit or loose connector contact
- Failed oxygen sensor (rear)

NOTE: When the oxygen sensor (front) begins to deteriorate, the oxygen sensor output voltage will deviate from the voltage when the sensor was new (normally 0.5 volt at stoichiometric ratio). This deviation will be corrected by the oxygen sensor (rear).If the oxygen sensor (rear) responds poorly because it has deteriorated, it will improperly correct the oxygen sensor (front). Thus, even when closed loop control is being effected, the fluctuation of the oxygen sensor (front) output voltage decreases, without intersecting with 0.5 volt. As a result, there is a possibility of diagnosis code P0125 becoming registered.

- Failed fuel system
- Failed exhaust system
- Air drawn in from gaps in gasket, seals, etc
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is any other diagnosis code than P0125 output?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.

a. Item 21: Engine coolant temperature sensor
b. Item 32: Manifold absolute pressure sensor
c. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?

YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data valve (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Check for intake of air from gaps in gasket, seals, etc.

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Repair for intake of air from gaps in gasket, seals, etc.

STEP 4. Check for leakage of exhaust emission from exhaust manifold.

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Repair for leakage of exhaust emission from exhaust manifold.

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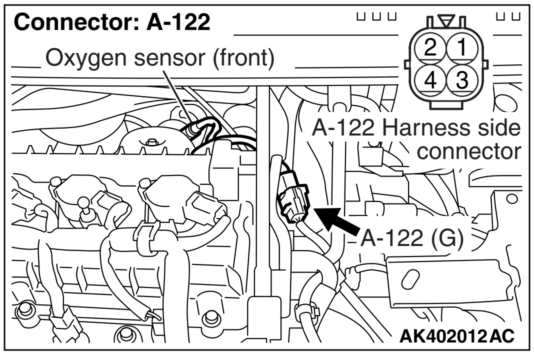
STEP 5. Check throttle body (throttle valve portion) for contamination.

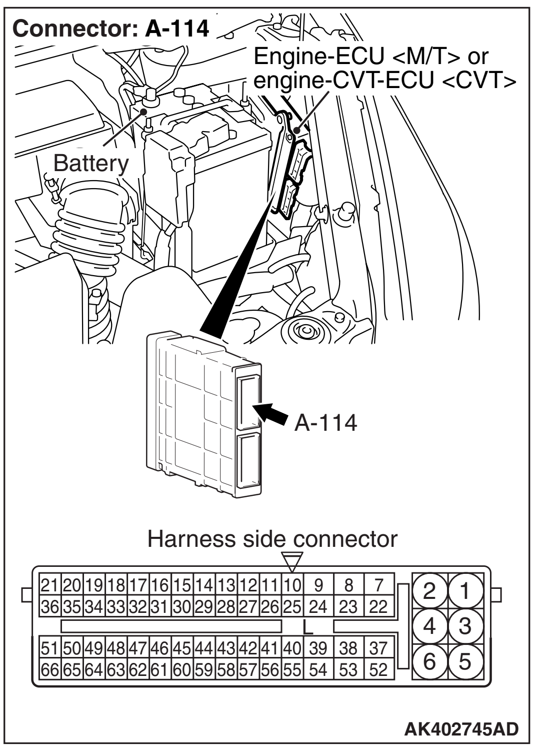
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

STEP 6. Connector check: A-122 oxygen sensor (front) connector, A-114 engine-ECU connector or engine-CVT-ECU connector.





Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check oxygen sensor (front) itself.

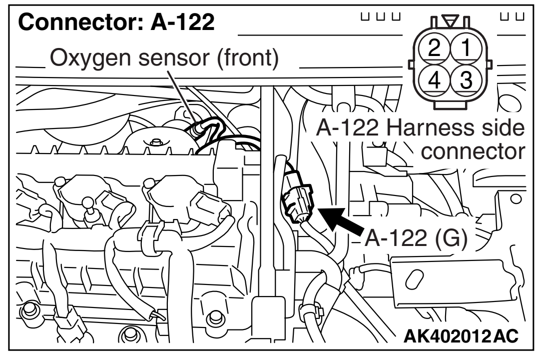
- Check oxygen sensor (front) itself (Refer to P.13A-362).

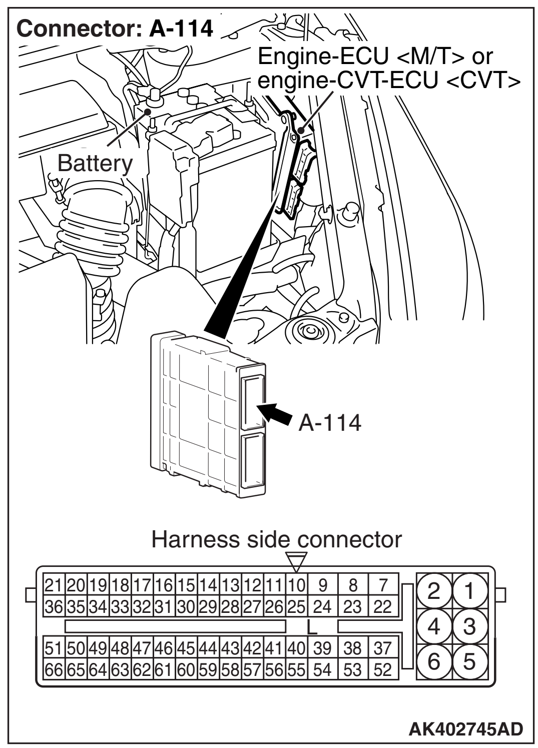
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Replace the oxygen sensor (front).

STEP 8. Check harness between A-122 (terminal No. 1) oxygen sensor (front) connector and A-114 (terminal No. 34) engine-ECU connector or engine-CVT-ECU connector.





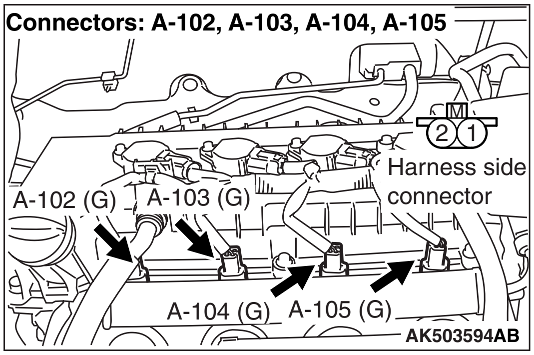
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Connector check: Injector connector



a. A-102 (No. 1 injector connector)
b. A-103 (No. 2 injector connector)
c. A-104 (No. 3 injector connector)
d. A-105 (No. 4 injector connector)

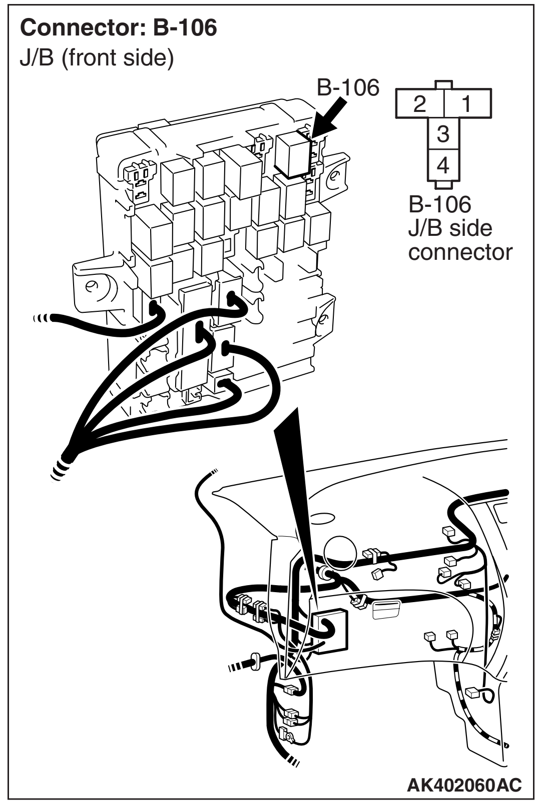
Q: Is the check result normal?
YES : Go to Step 10 .
NO : Repair or replace the connector.

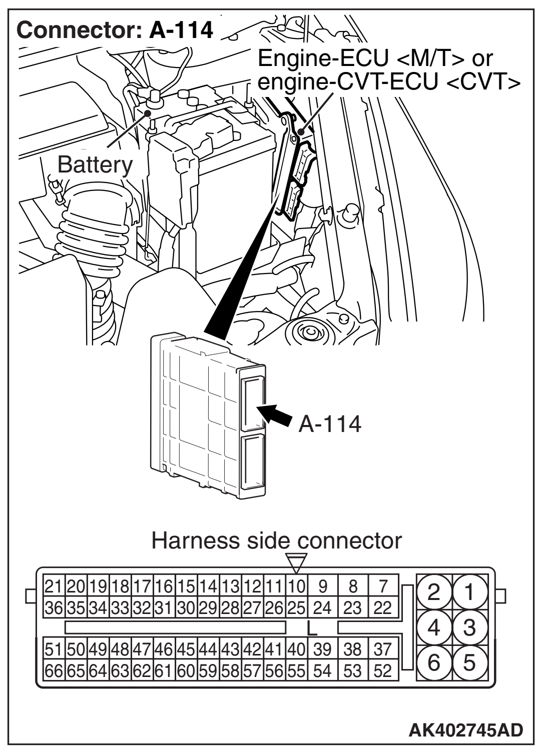
STEP 10. Check injector itself.

- Check Injector itself (Refer to P.13A-364).

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Replace the injector.

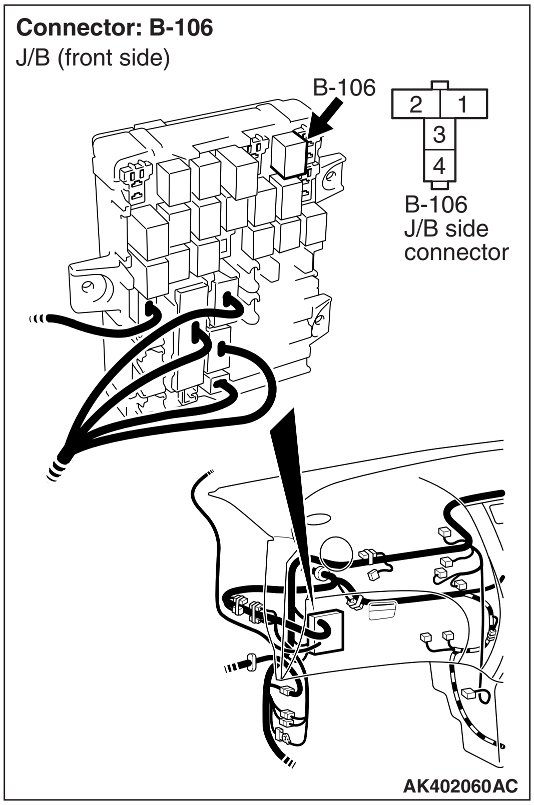
STEP 11. Connector check: B-106 engine control relay connector and A-114 engine-ECU connector or engine-CVT-ECU connector.

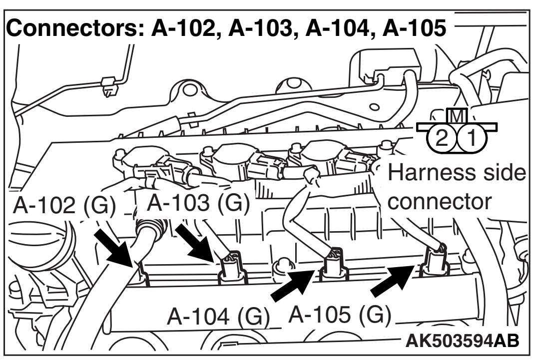




Q: Is the check result normal?
YES : Go to Step 12 .
NO : Repair or replace the connector.

STEP 12. Check harness between B-106 engine control relay connector and injector connector.





a. Check harness between B-106 (terminal No. 4) engine control relay connector and A-102 (terminal No. 1) No. 1 injector connector.
b. Check harness between B-106 (terminal No. 4) engine control relay connector and A-103 (terminal No. 1) No. 2 injector connector.
c. Check harness between B-106 (terminal No. 4) engine control relay connector and A-104 (terminal No. 1) No. 3 injector connector.
d. Check harness between B-106 (terminal No. 4) engine control relay connector and A-105 (terminal No. 1) No. 4 injector connector.

NOTE: Before checking harness, check intermediate connector A-17 and B-112, repair if necessary.

- Check power supply line for damage.

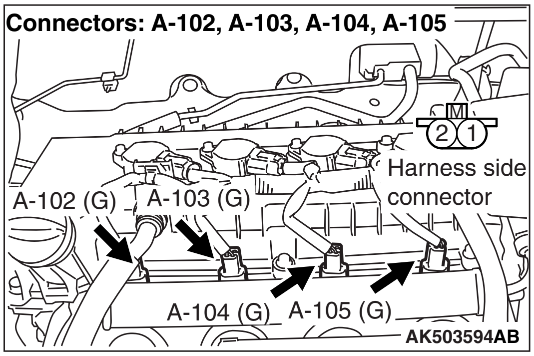
Q: Are the check results normal?

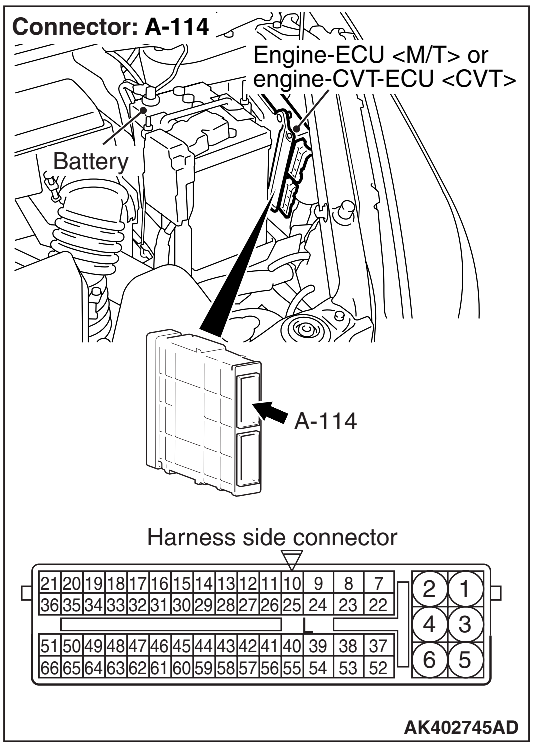
YES : Go to Step 13 .

NO : Repair the damaged harness wire.

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STEP 13. Check harness between injector connector and A-114 engine-ECU connector or engine-CVT-ECU connector.





a. Check harness between A-102 (terminal No. 2) No. 1 injector connector and A-114 (terminal No. 8) engine-ECU connector or engine-CVT-ECU connector.

b. Check harness between A-103 (terminal No. 2) No. 2 injector connector and A-114 (terminal No. 9) engine-ECU connector or engine-CVT-ECU connector.

c. Check harness between A-104 (terminal No. 2) No. 3 injector connector and A-114 (terminal No. 23) engine-ECU connector or engine-CVT-ECU connector.

d. Check harness between A-105 (terminal No. 2) No. 4 injector connector and A-114 (terminal No. 24) engine-ECU connector or engine-CVT-ECU connector.

- Check earthing line for damage.

Q: Are the check results normal?

YES : Go to Step 14 .

NO : Repair the damaged harness wire.

STEP 14. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

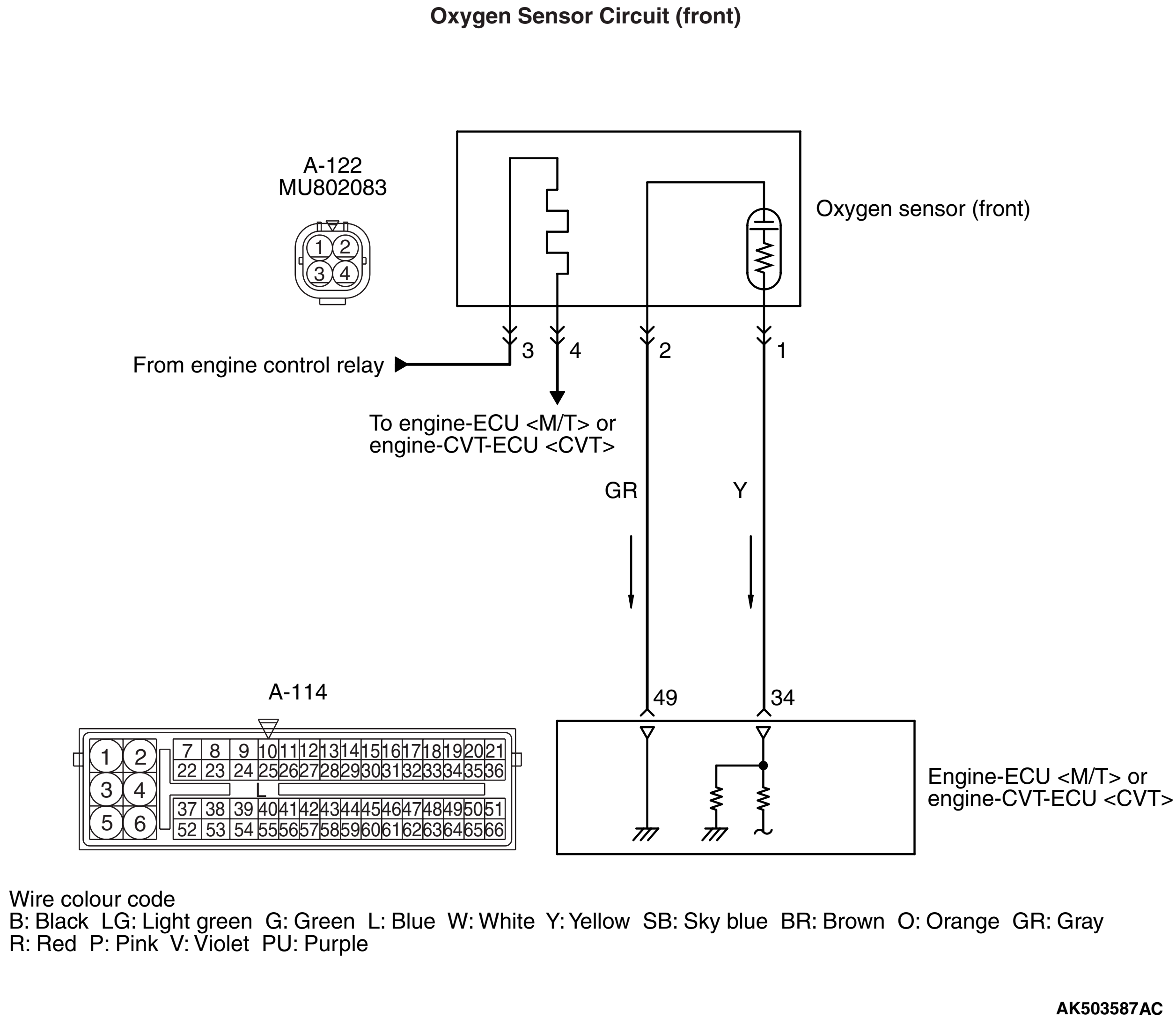
Q: Is the check result normal?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Repair the fuel pressure.

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Code No. P0130: Oxygen Sensor (Front) System



OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 34) from the oxygen sensor output terminal (terminal No. 1).
- The oxygen sensor (front) (terminal No. 2) is earthed with engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 49).

FUNCTION

- The oxygen sensor converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the oxygen sensor outputs a voltage of about 1 V. When it is leaner than the theoretical air-fuel ratio, it outputs a voltage of about 0 V.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the fuel infection amount so that the air-fuel ratio can be equivalent to the theoretical air-fuel ratio.

TROUBLE JUDGMENT

Check Conditions

- Above 5 minutes later after the engine has started up.
- The engine coolant temperature is above 82°C for 5 seconds or longer <M/T>.
- The engine speed is above 1,200 r/min for 5 seconds or longer <M/T>.

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- The intake manifold pressure is above 20 kPa for 5 seconds or longer <M/T>.
- Oxygen sensor (front) output voltage is 0.5 V or less <CVT>.
- The engine coolant temperature is approximately 80°C or higher <CVT>.
- The engine speed is 1,200 r/min or more <CVT>.
- During the run at the constant speed on the flat road <CVT>.

Judgment Criteria

- When 5 V is applied to oxygen sensor (front) output line via register, engine-ECU-interface output voltage is more than 4.0 V <M/T>.
- When a power voltage of 5 V is applied to the oxygen sensor, the sensor output voltage is 4.0 V or more <CVT>.

Check Conditions

- Engine speed is more than 1,200 r/min and is less than 3,000 r/min <M/T>.
- The engine coolant temperature is above 50°C <M/T>.
- The intake manifold pressure is more than 30 kPa and is less than 60 kPa <M/T>.
- Within the range of air-fuel ratio feedback operation <M/T>.

Judgment Criterion

- The oxygen sensor (front) sends "lean" and "rich" signals alternately 6 times or less for 10 seconds <M/T>.

PROBABLE CAUSES

- Failed oxygen sensor
- Open/short circuit in oxygen sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

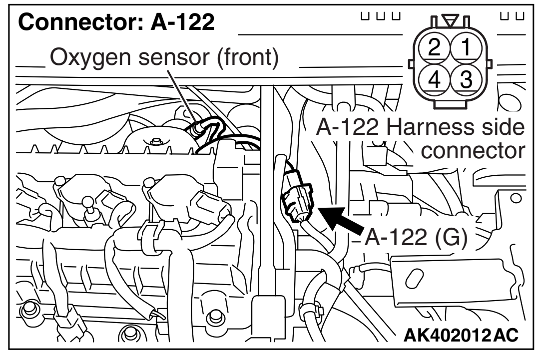
DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 11: Oxygen sensor (front)

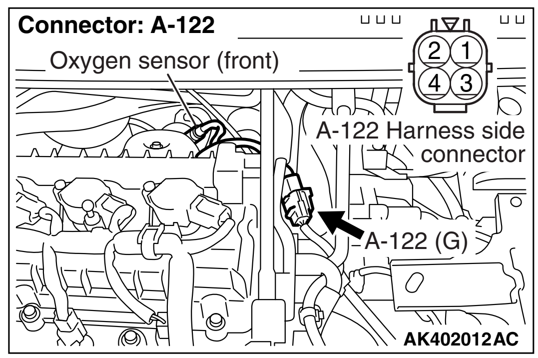
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Go to Step 2 .

STEP 2. Connector check: A-122 oxygen sensor (front) connector



Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-122 oxygen sensor (front) connector.



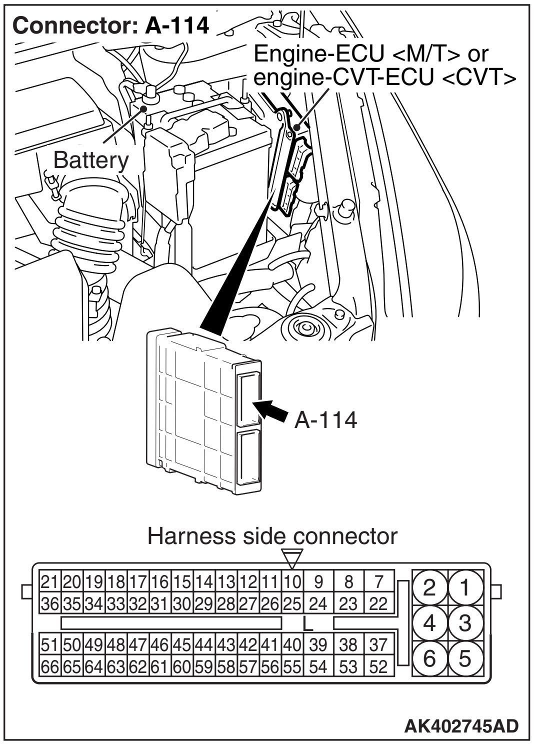
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

  OK: Continuity (2 Ω or less)

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

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STEP 4. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

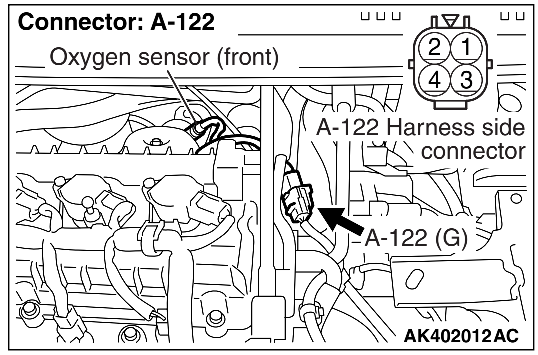


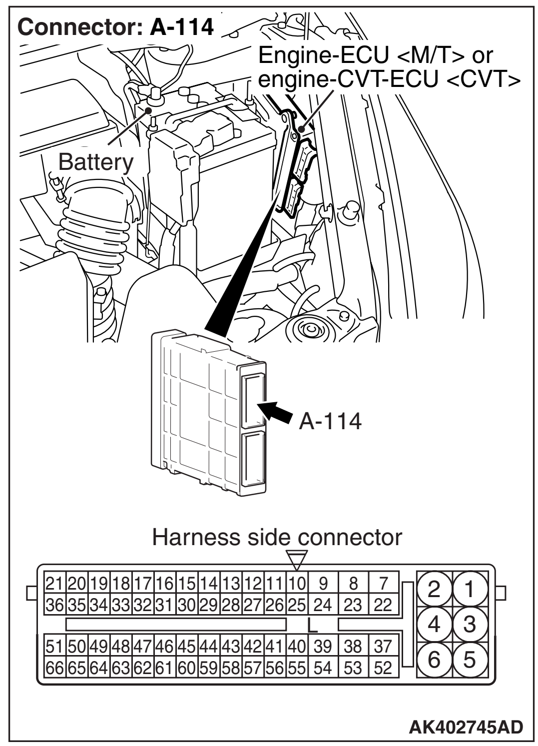
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5. Check harness between A-122 (terminal No. 2) oxygen sensor connector and A-114 (terminal No. 49) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 11: Oxygen sensor (front)

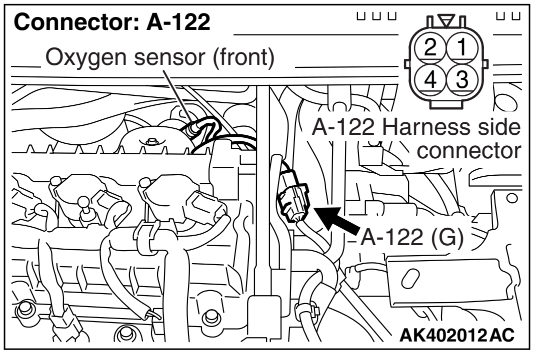
Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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STEP 7. Perform voltage measurement at A-122 oxygen sensor connector.



- Use special tool test harness (MD991658) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Transmission: P range
- Voltage between terminal No. 2 and earth.

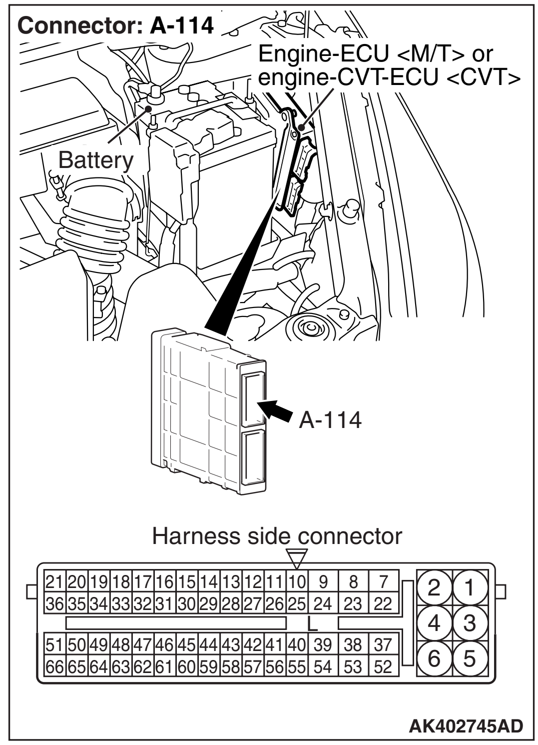
OK: 0.5 V or less

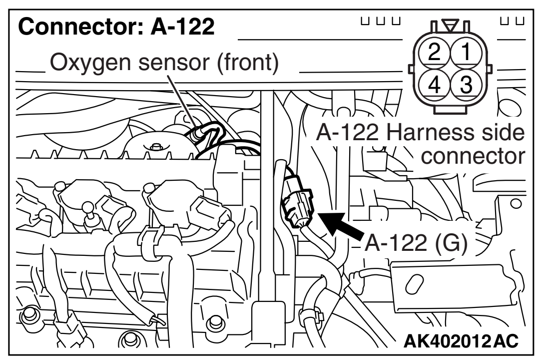
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 8 .

STEP 8. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





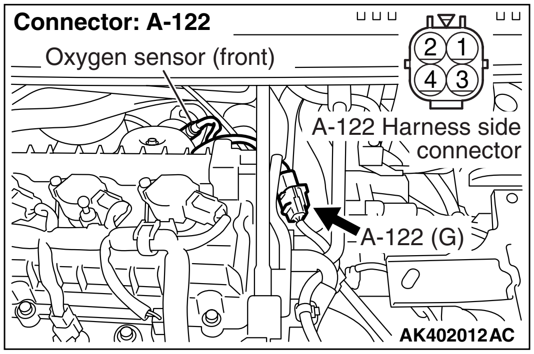
Q: Is the check result normal?

YES : Check and repair harness between A-122 (terminal No. 2) oxygen sensor connector and A-114 (terminal No. 49) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for damage.

NO : Repair or replace the connector.

STEP 9. Perform voltage measurement at A-122 oxygen sensor connector.



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Transmission: P range
- Engine: After warm-up
- Voltage between terminal No. 1 and earth.

OK:
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

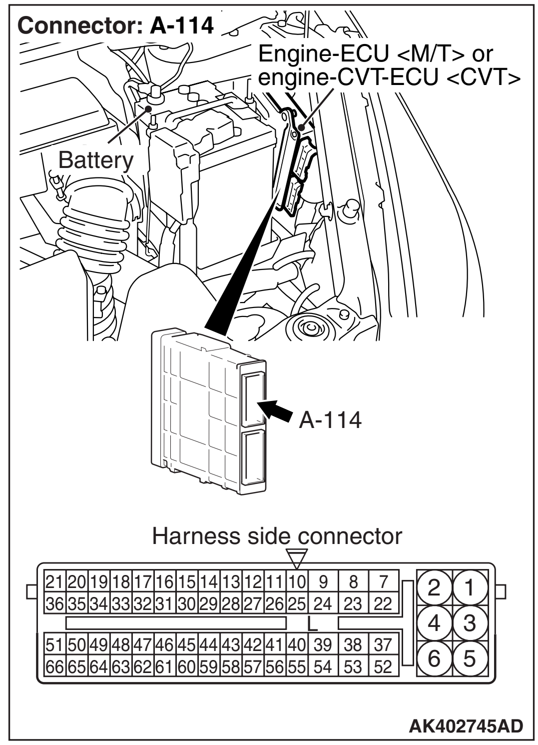
Q: Is the check result normal?
YES : Go to Step 12 .
NO : Go to Step 10 .

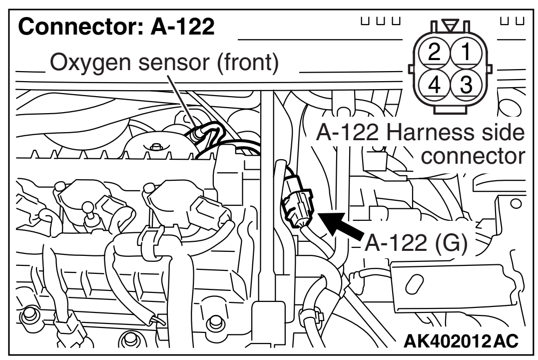
STEP 10. Check oxygen sensor itself

- Check oxygen sensor itself (Refer to P.13A-362).

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Replace oxygen sensor.

STEP 11. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



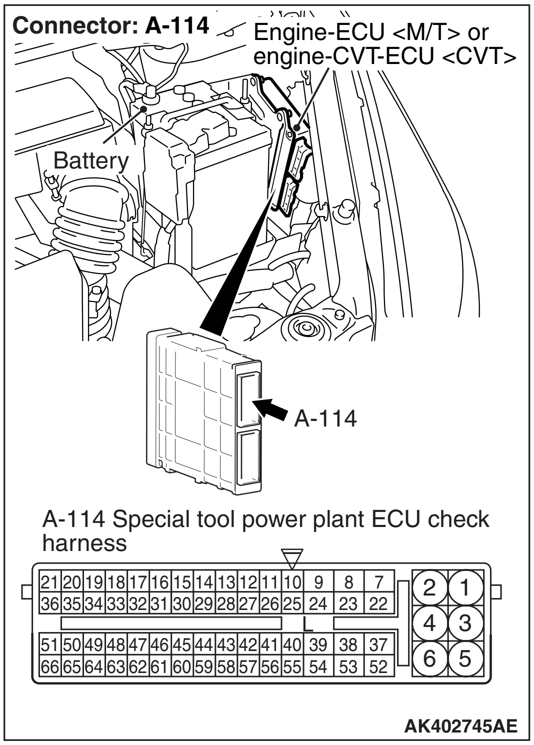


Q: Is the check result normal?
YES : Check and repair harness between A-122 (terminal No. 1) oxygen sensor connector and A-114 (terminal No. 34) engine-ECU connector or engine-CVT-ECU connector.
- Check output line for open circuit.

NO : Repair or replace the connector.

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STEP 12. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.

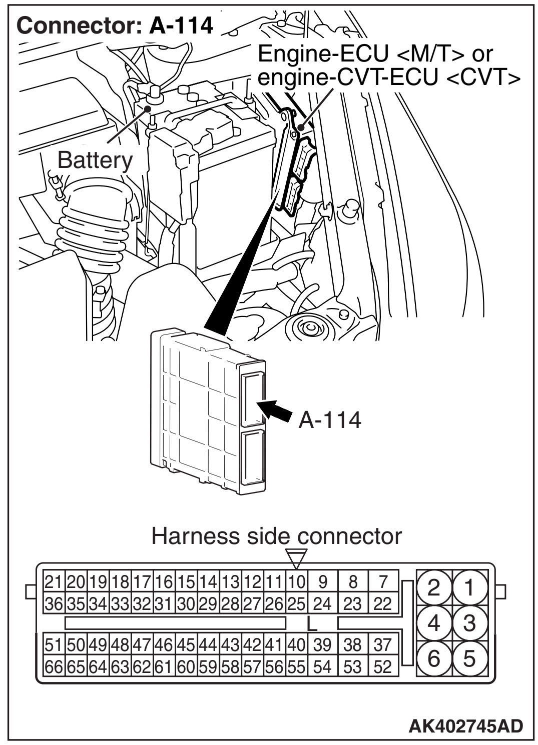


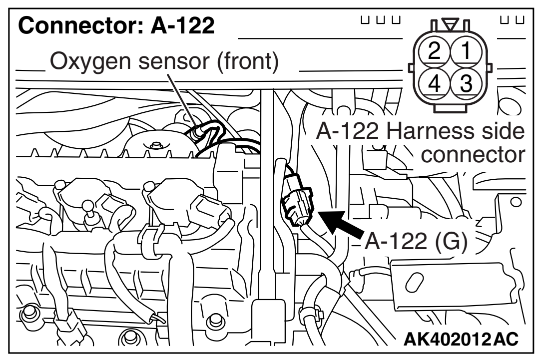
- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Transmission: P range
- Engine: After warm-up
- Voltage between terminal No. 34 and earth.

OK:
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?
YES : Go to Step 14 .
NO : Go to Step 13 .

STEP 13. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



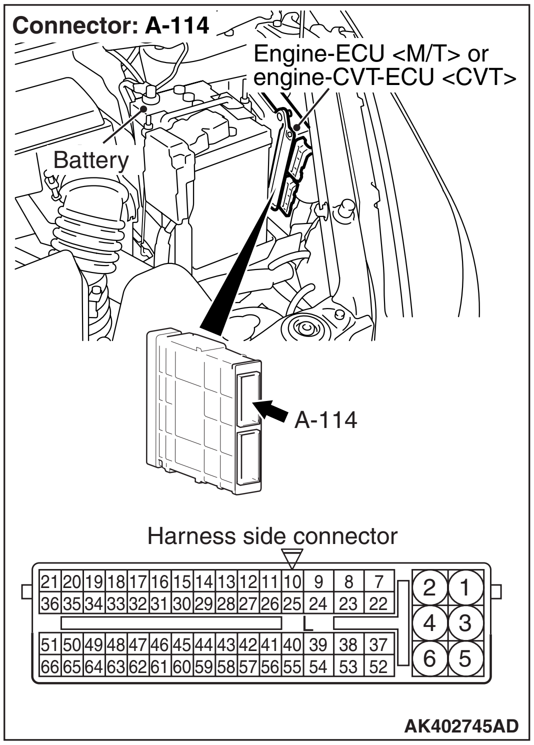


Q: Is the check result normal?
YES : Check and repair harness between A-122 (terminal No. 1) oxygen sensor connector and A-114 (terminal No. 34) engine-ECU connector or engine-CVT-ECU connector.
- Check output line for damage.

NO : Repair or replace the connector.

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STEP 14. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



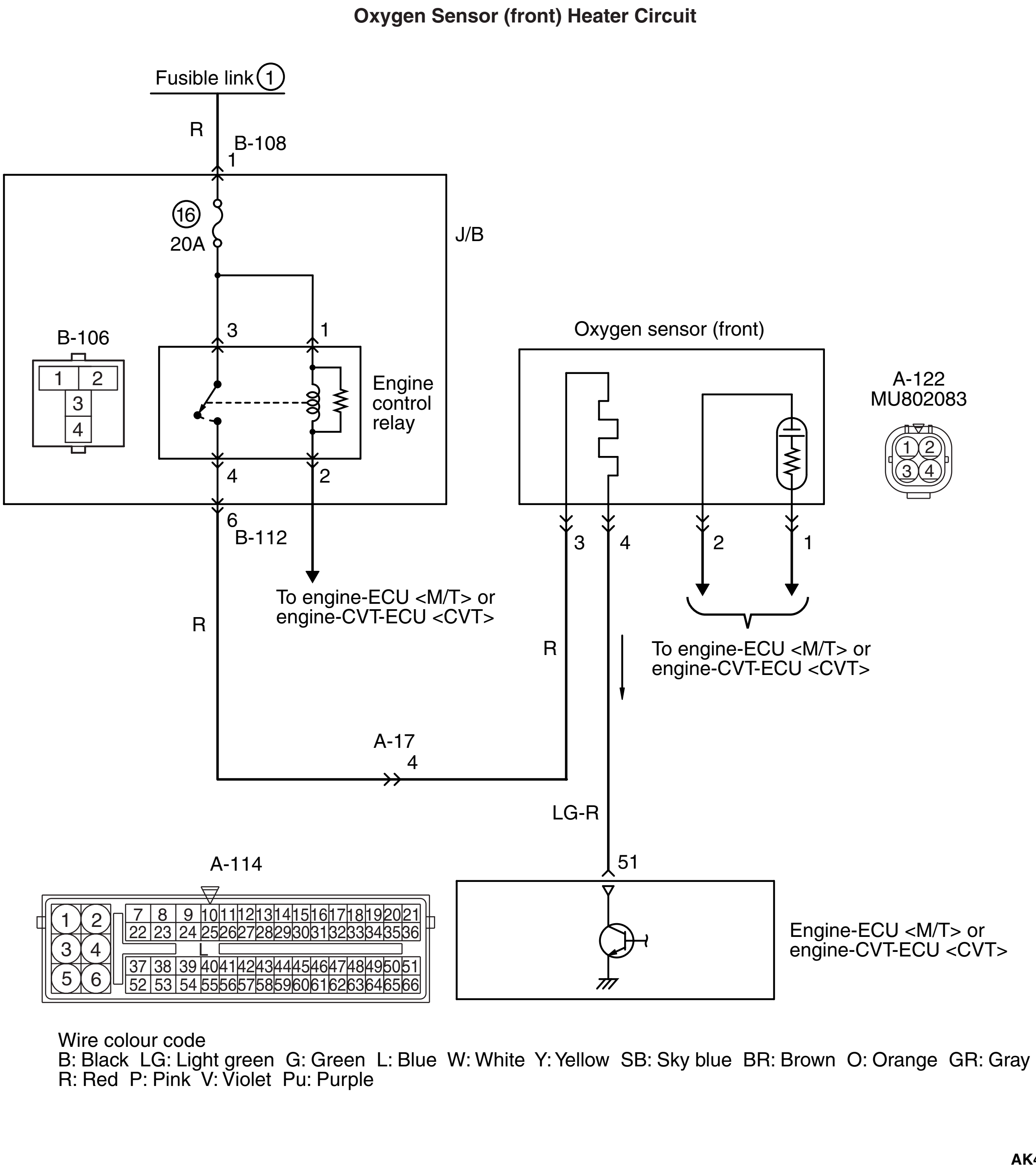
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

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Code No. P0135: Oxygen Sensor (Front) Heater System



OPERATION

- Power is supplied to the heater power terminal (terminal No. 3) of the oxygen sensor connector from the engine control relay (terminal No. 4).
- The heater (terminal No. 4) of the oxygen sensor connector is controlled by the power transistor in the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 51).

FUNCTION

- The power supply to the oxygen sensor heater is controlled by the ON/OFF control of the power transistor in the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- Heating the oxygen sensor heater enables the oxygen sensor to provide good response even when the exhaust emission temperature is low.

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TROUBLE JUDGMENT

Check Conditions

- After engine starts <M/T>
- Engine coolant temperature is 20°C or higher.
- While oxygen sensor heater is on <CVT>.
- Engine speed is approximately 50 r/min or more <CVT>.
- Battery positive voltage is 11 – 16 V

Judgment Criterion

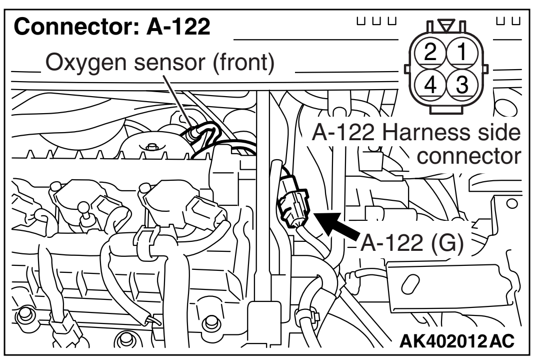
- Oxygen sensor heater currents has continued to be 0.16 A or lower, or 5 A or higher for 4 seconds.

PROBABLE CAUSES

- Failed oxygen sensor heater
- Open/short circuit in oxygen sensor heater circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-122 oxygen sensor connector

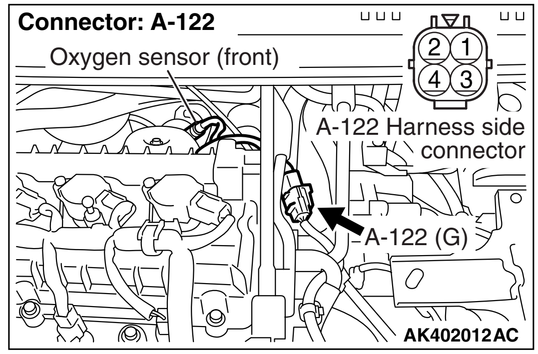


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at A-122 oxygen sensor connector.



- Disconnect connector, and measure at sensor side.
- Resistance between terminals No. 3 and No. 4.

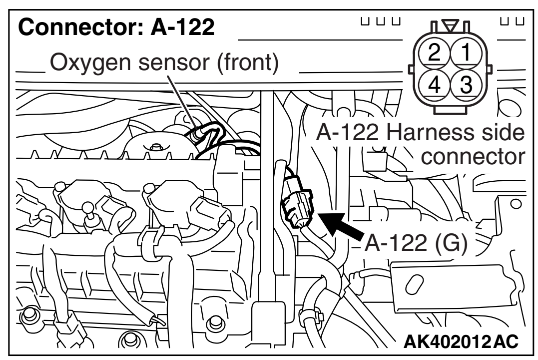
OK: 5 – 30 Ω (at 20C°)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace oxygen sensor.

STEP 3. Perform voltage measurement at A-122 oxygen sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

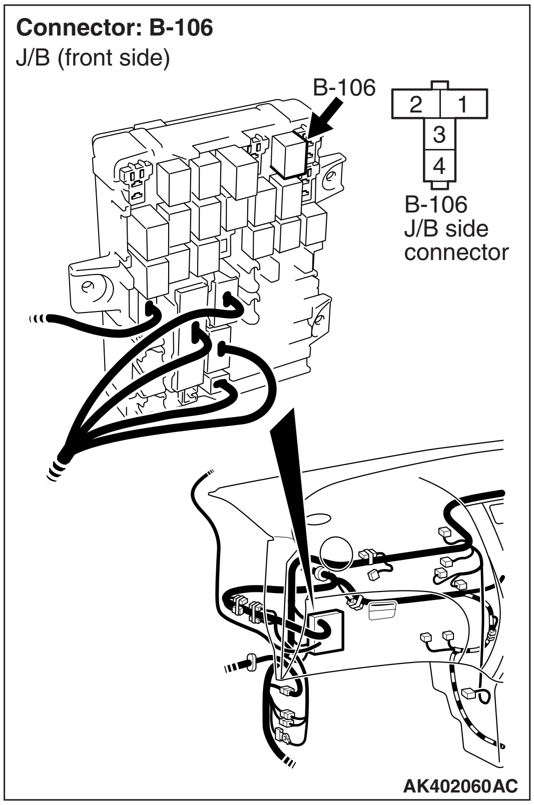
OK: System voltage

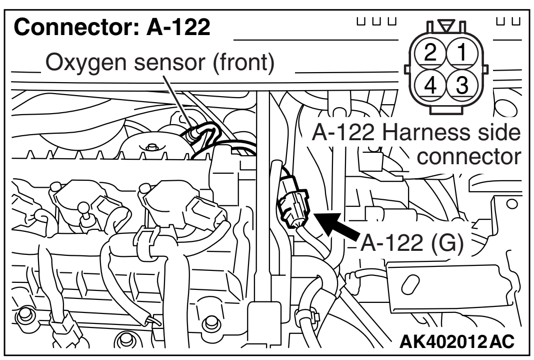
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: B-106 engine control relay connector





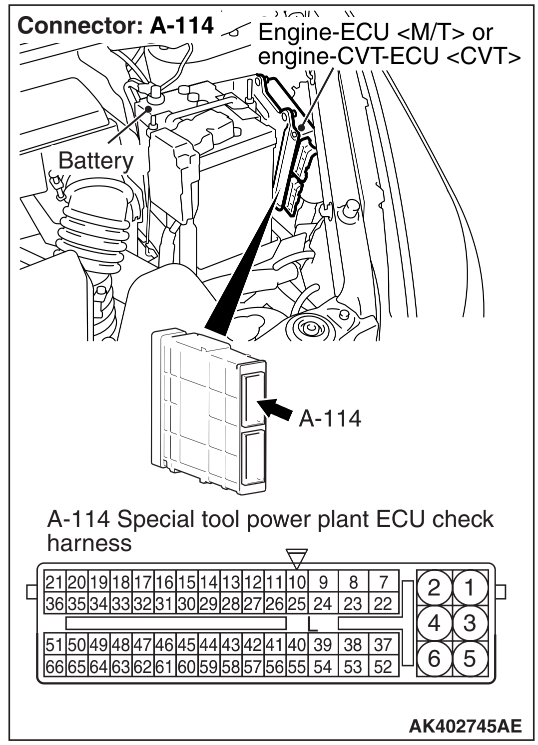
Q: Is the check result normal?

YES : Check intermediate connector A-17 and B-122, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-122 (terminal No. 3) oxygen sensor connector and B-106 (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Ignition switch: ON
- Voltage between terminal No. 51 and earth.

OK: System voltage

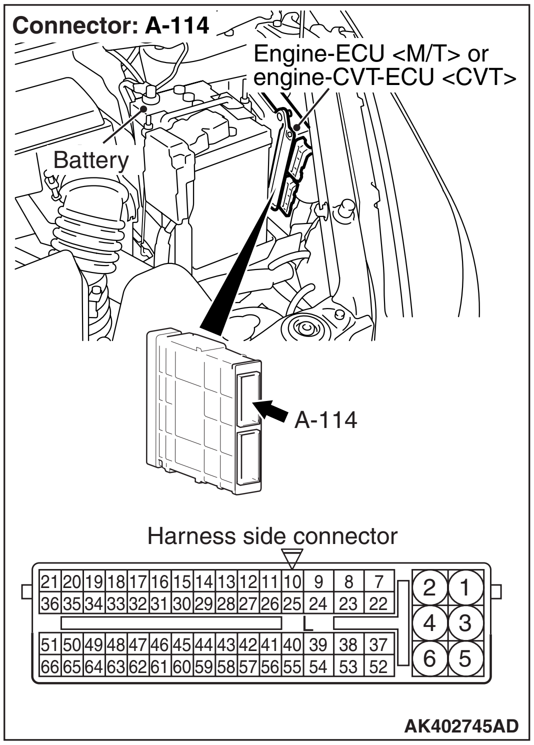
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 6 .

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STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

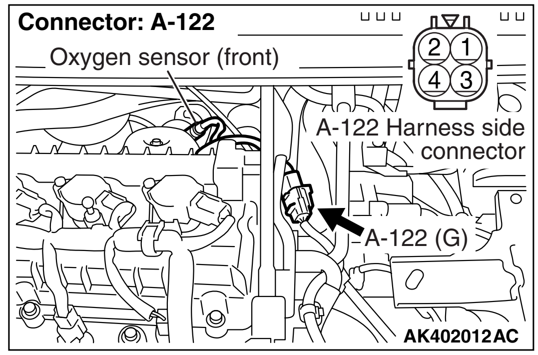


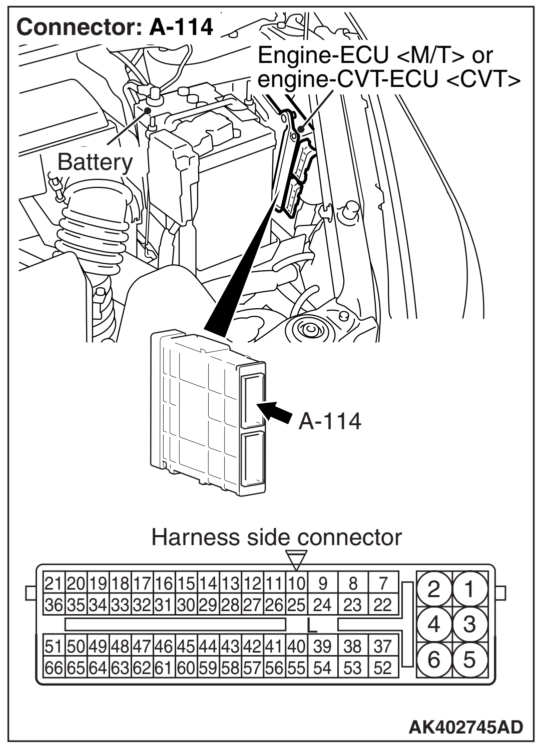
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between A-122 (terminal No. 4) oxygen sensor connector and A-114 (terminal No. 51) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open/short circuit.

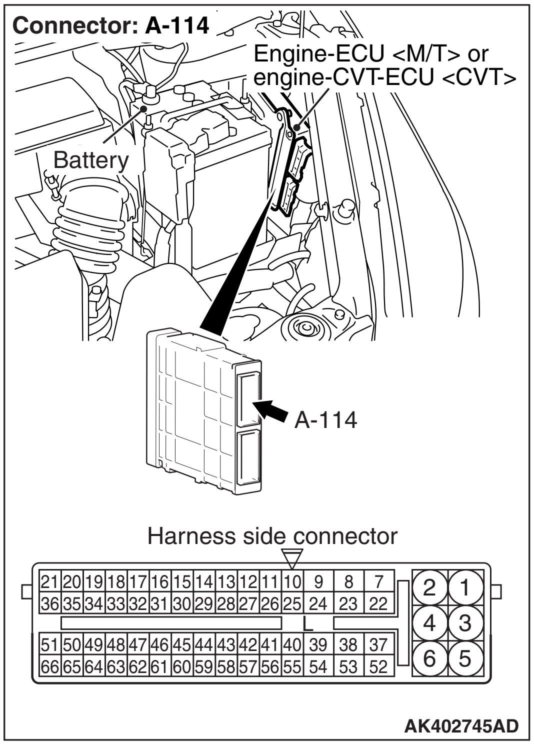
Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Repair the damaged harness wire.

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STEP 8. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

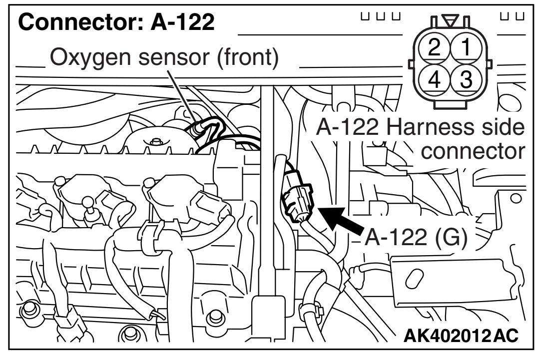


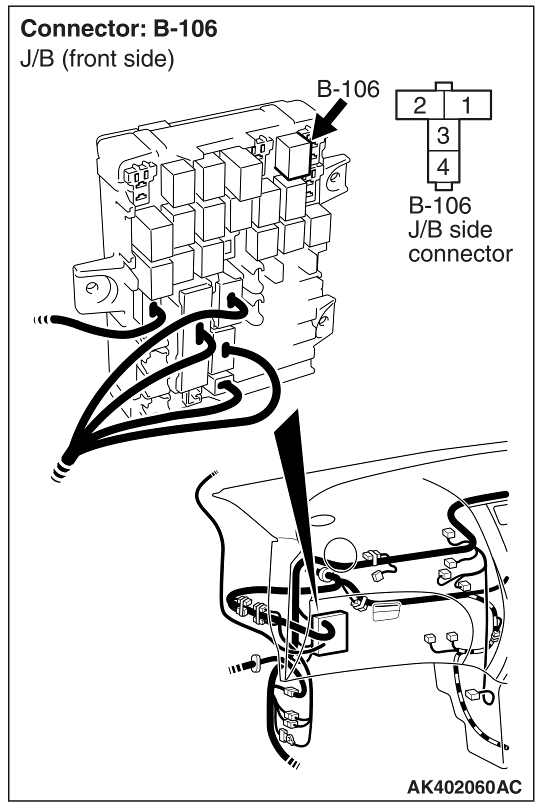
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace the connector.

STEP 9. Check harness between A-122 (terminal No. 3) oxygen sensor connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

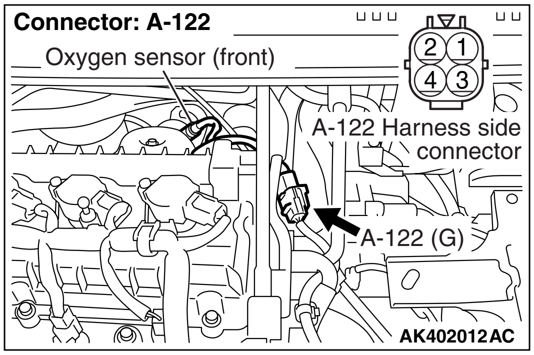
Q: Is the check result normal?

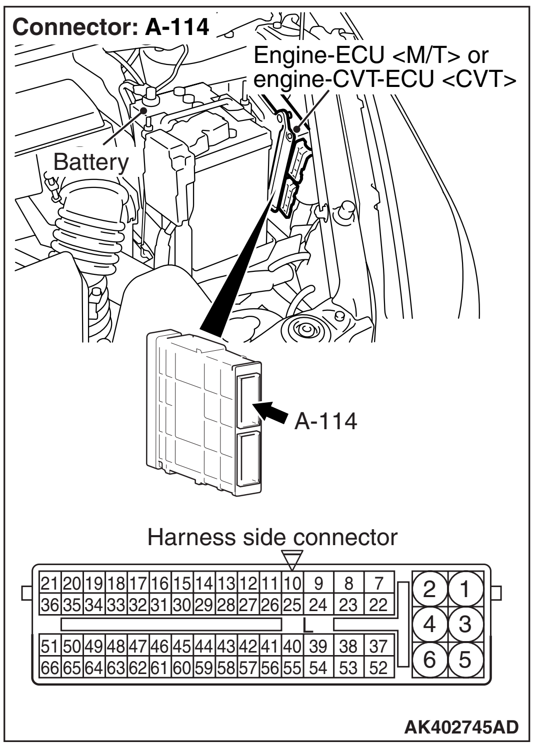
YES : Go to Step 10 .

NO : Repair the damaged harness wire.

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STEP 10. Check harness between A-122 (terminal No. 4) oxygen sensor connector and A-114 (terminal No. 51) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair the damaged harness wire.

STEP 11. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code

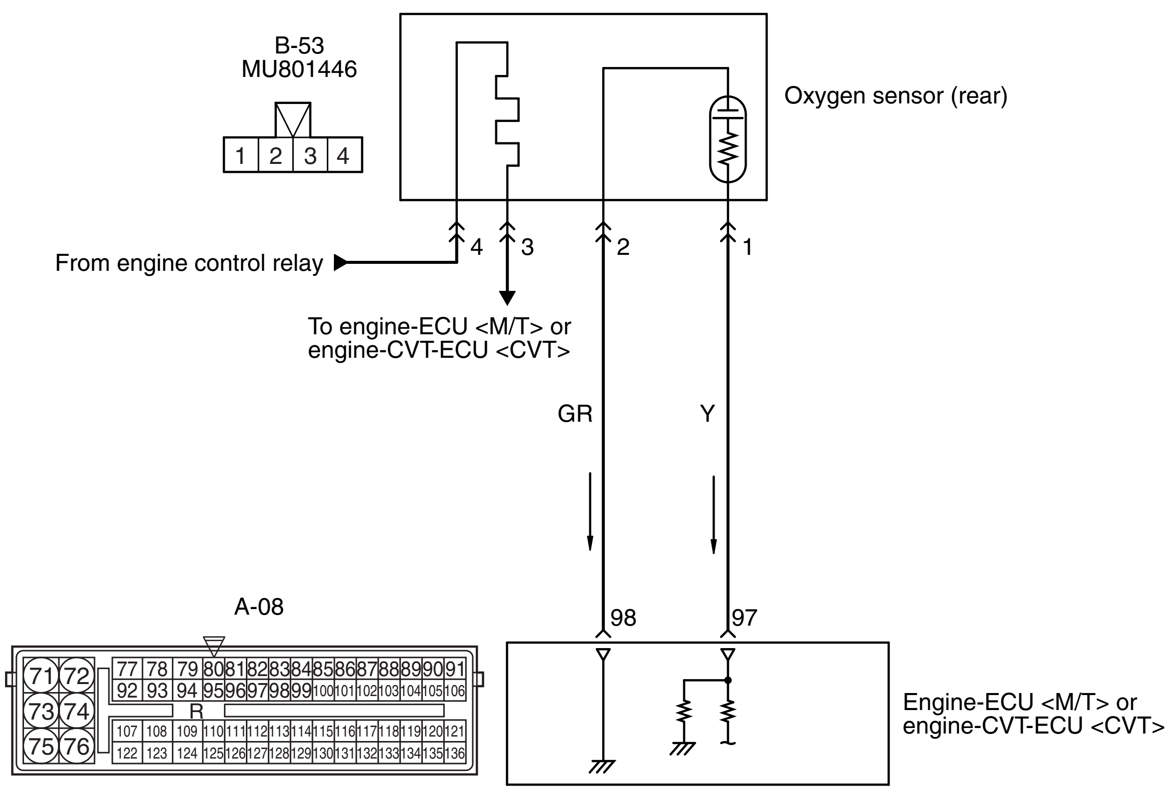
Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0136: Oxygen Sensor (Rear) System

Oxygen Sensor (rear) Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet PU: Purple

AK503588AC

OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 97) from the oxygen sensor (rear) output terminal (terminal No. 1).
- The oxygen sensor (rear) (terminal No. 2) is earthed with engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 98).

FUNCTION

- The oxygen sensor (rear) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the oxygen sensor (rear) outputs a voltage of about 1 V. When it is leaner than the theoretical air-fuel ratio, it outputs a voltage of about 0 V.
- Based on this signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> corrects the deviation in the signal that is output by the oxygen sensor (rear).

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TROUBLE JUDGMENT

Check Conditions

- Above 3 minutes later after the engine has started up <M/T>.
- The engine coolant temperature is above 82°C for 5 seconds or longer <M/T>.
- The engine speed is above 1,200 r/min for 5 seconds or longer <M/T>.
- The intake manifold pressure is above 20 kPa for 5 seconds or longer <M/T>.
- Above 5 minutes later after the engine has started up <CVT>.
- The engine coolant temperature is approximately 80°C or higher <CVT>.
- The engine speed is 1,200 r/min or more <CVT>.
- During the run at the constant speed on the flat load <CVT>.

Judgment Criterion

- When a power voltage of 5 V is applied to the oxygen sensor (rear) in the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the sensor output voltage is 4.0 V or more.

PROBABLE CAUSES

- Failed oxygen sensor (rear)
- Open/short circuit in oxygen sensor (rear) circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

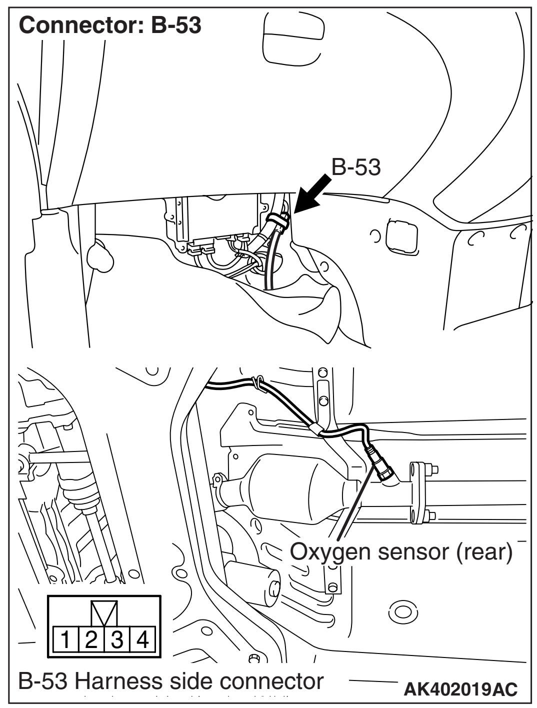
- Refer to Data List Reference Table P.13A-331.
  a. Item 59: Oxygen sensor (rear)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-53 oxygen sensor (rear) connector



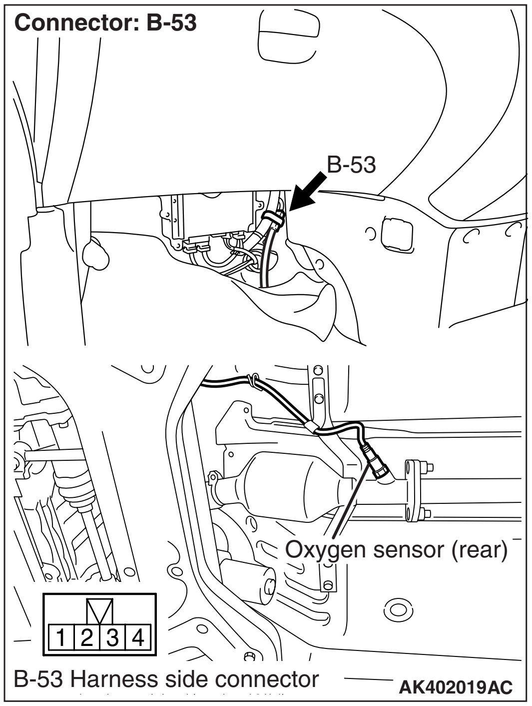
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

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STEP 3. Perform resistance measurement at B-53 oxygen sensor (rear) connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

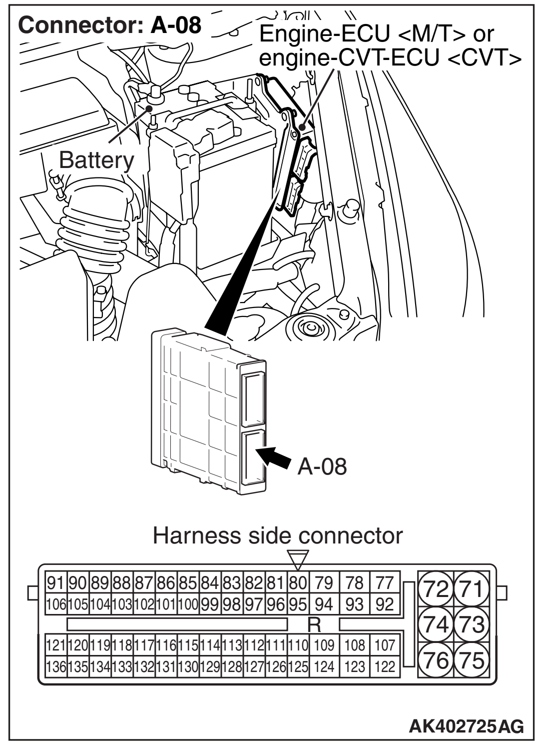
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



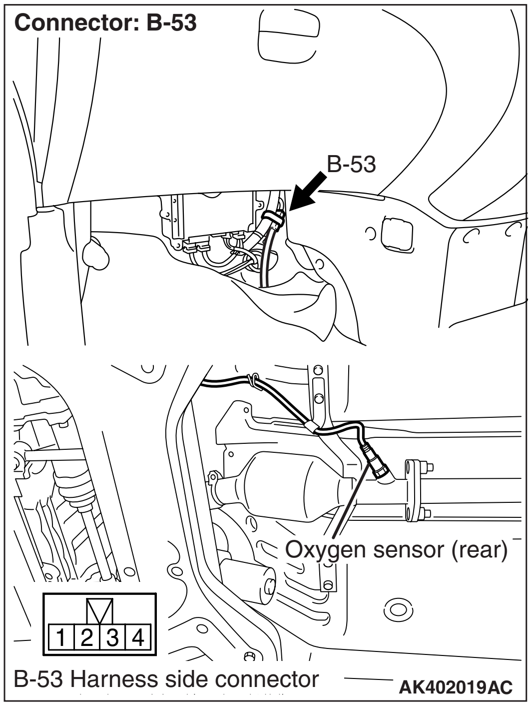
Q: Is the check result normal?

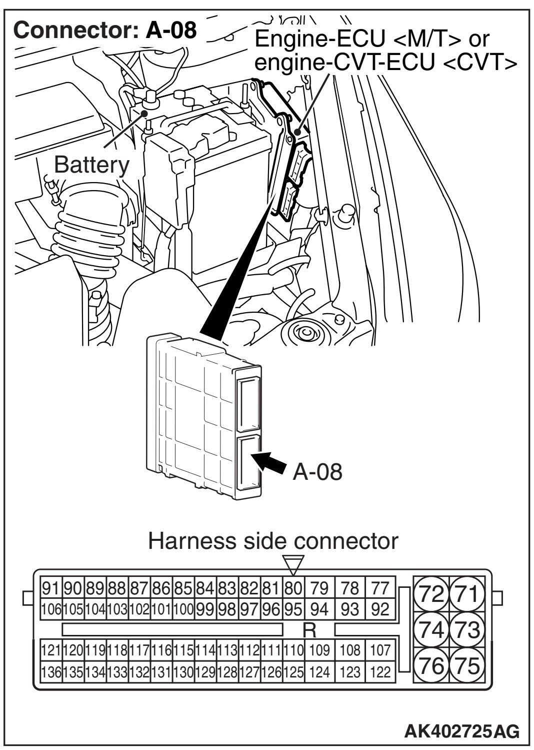
YES : Go to Step 5 .

NO : Repair or replace the connector.

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STEP 5. Check harness between B-53 (terminal No. 2) oxygen sensor (rear) connector and A-08 (terminal No. 98) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

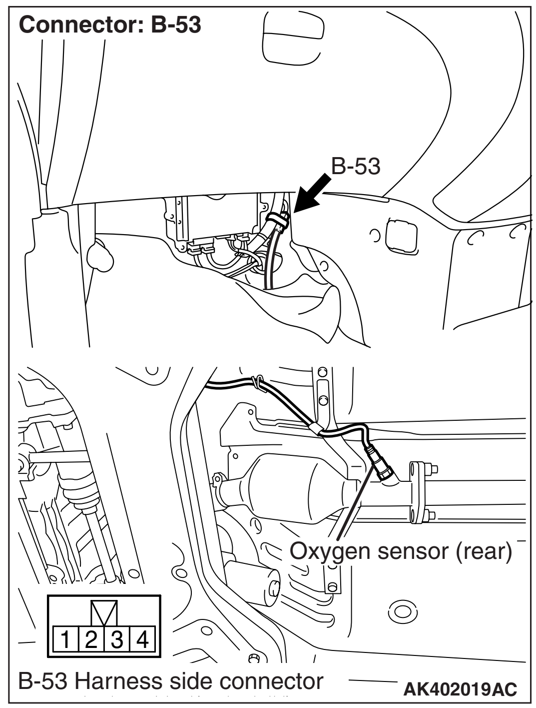
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 59: Oxygen sensor (rear)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Perform voltage measurement at B-53 oxygen sensor (rear) connector.



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Transmission: Neutral
- Voltage between terminal No. 1 and earth.

OK:
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately

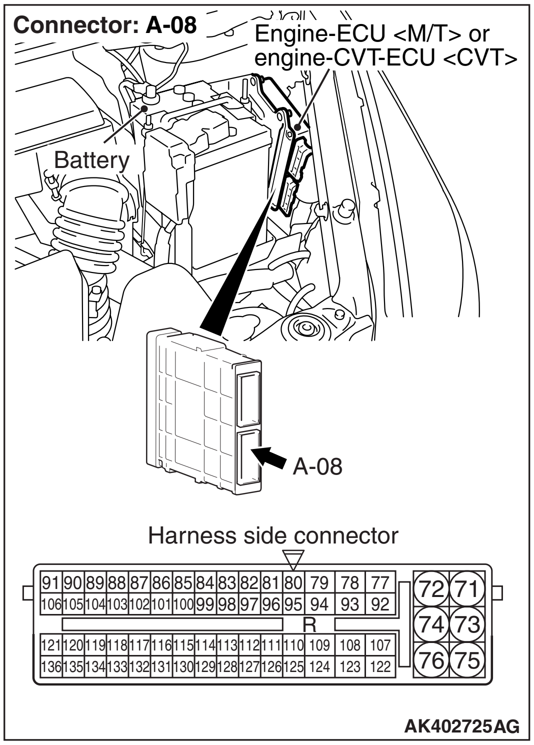
Q: Is the check result normal?
YES : Go to Step 10 .
NO : Go to Step 8 .

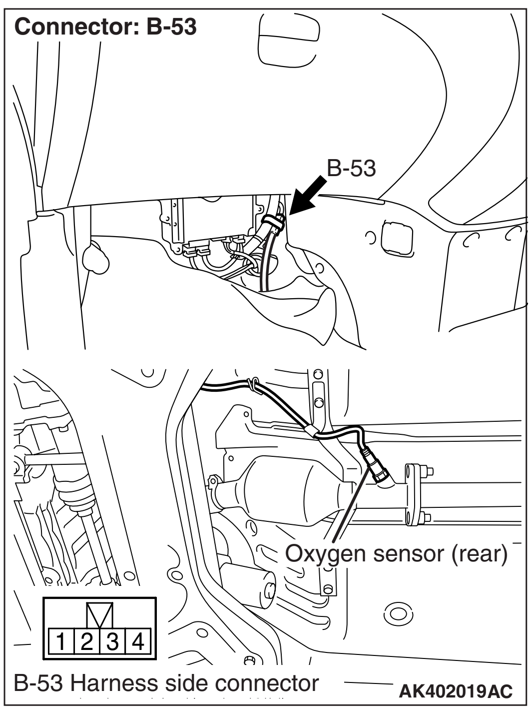
STEP 8. Check Oxygen sensor (rear) itself.

- Check oxygen sensor (rear) itself (Refer to P.13A-362).

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Replace the oxygen sensor (rear).

STEP 9. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector





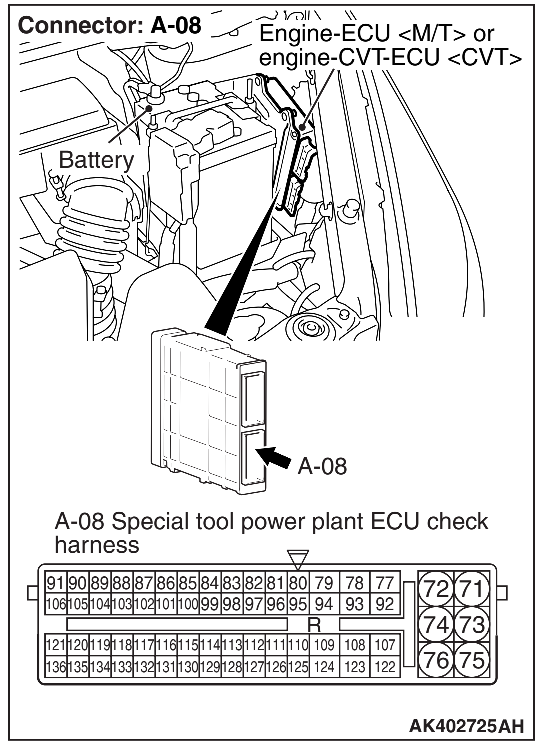
Q: Is the check result normal?

YES : Check and repair harness between B-53 (terminal No. 1) oxygen sensor (rear) connector and A-08 (terminal No. 97) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for short circuit.

NO : Repair or replace the connector.

STEP 10. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Transmission: P range
- Engine: After warm-up
- Voltage between terminal No. 97 and earth.

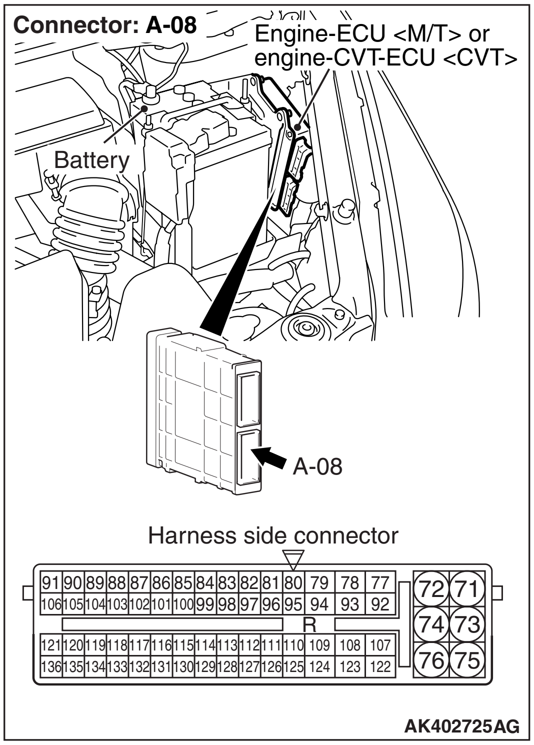
OK:
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

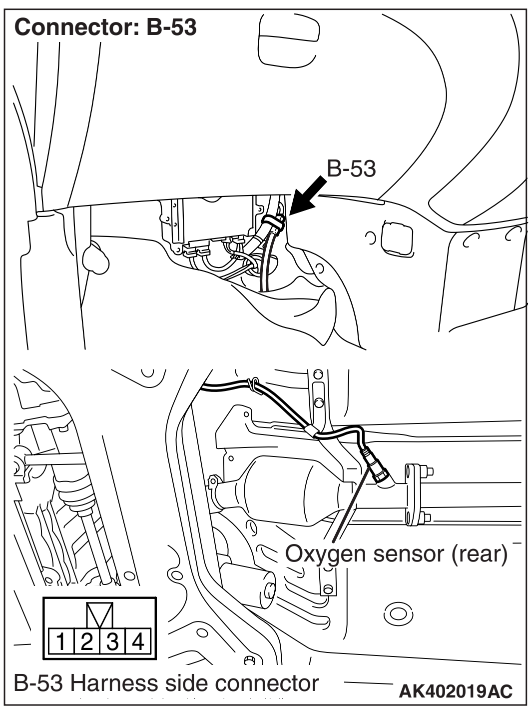
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

STEP 11. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector





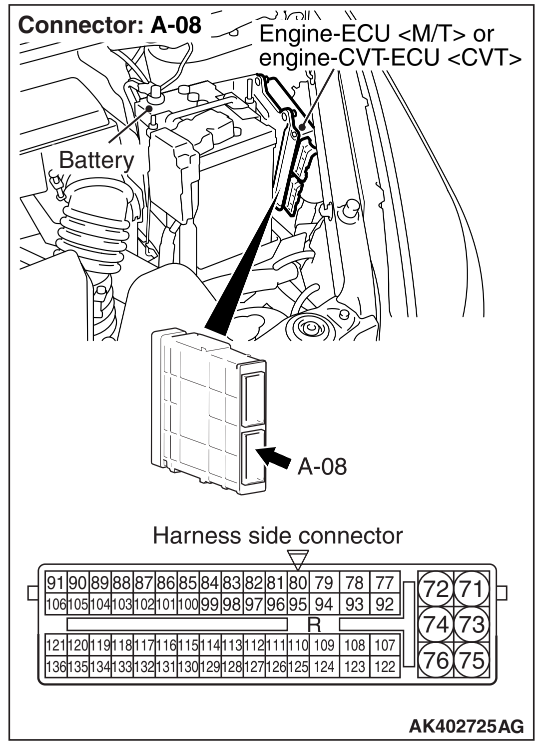
Q: Is the check result normal?

YES : Check and repair harness between B-53 (terminal No. 1) oxygen sensor (rear) connector and A-08 (terminal No. 97) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for open circuit and damage.

NO : Repair or replace the connector.

STEP 12. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

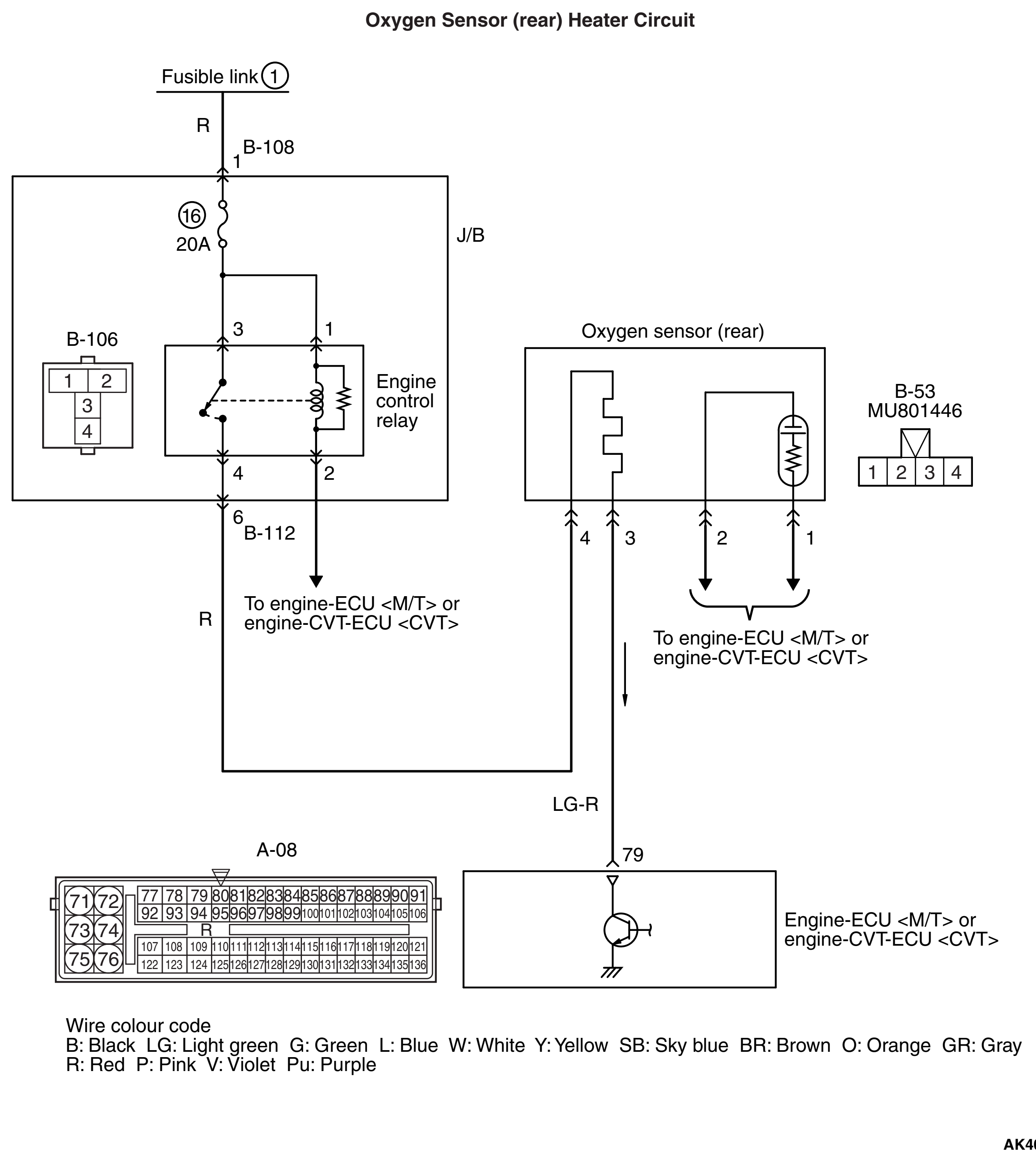


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

Code No. P0141: Oxygen sensor (Rear) Heater System



OPERATION

- Power is supplied to the heater power terminal (terminal No. 4) of the oxygen sensor (rear) connector from the engine control relay (terminal No. 4).
- The heater (terminal No. 3) of the oxygen sensor (rear) connector is controlled by the power transistor in the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 79).

FUNCTION

- The power supply to the oxygen sensor (rear) heater is controlled by the ON/OFF control of the power transistor in the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- Heating the oxygen sensor (rear) heater enables the oxygen sensor (rear) to provide good response even when the exhaust emission temperature is low.

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TROUBLE JUDGMENT

Check Conditions

- After engine starts <M/T>
- Engine coolant temperature is 20°C or higher.
- While oxygen sensor (rear) heater is on <CVT>.
- Battery positive voltage is 11 – 16 V.
- Engine speed is approximately 50 r/min or more <CVT>.

Judgment Criterion

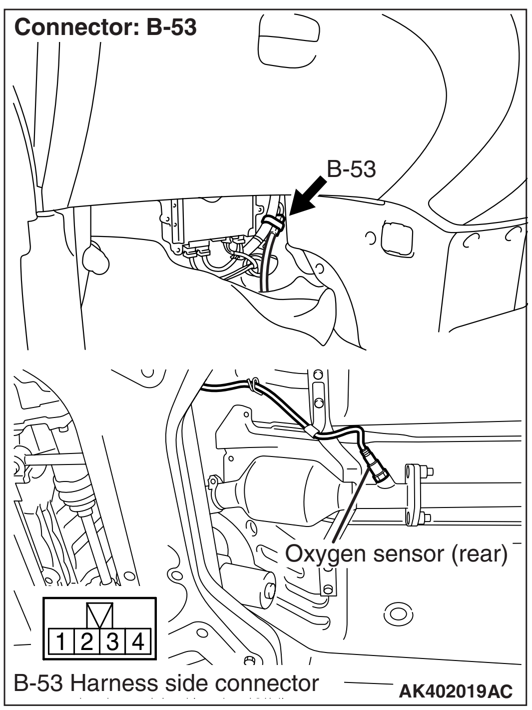
- Oxygen sensor (rear) heater currents have continued to be 0.16 A or lower, or 5.0 A or higher for 4 seconds.

PROBABLE CAUSES

- Failed oxygen sensor (rear) heater
- Open/short circuit in oxygen sensor (rear) circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

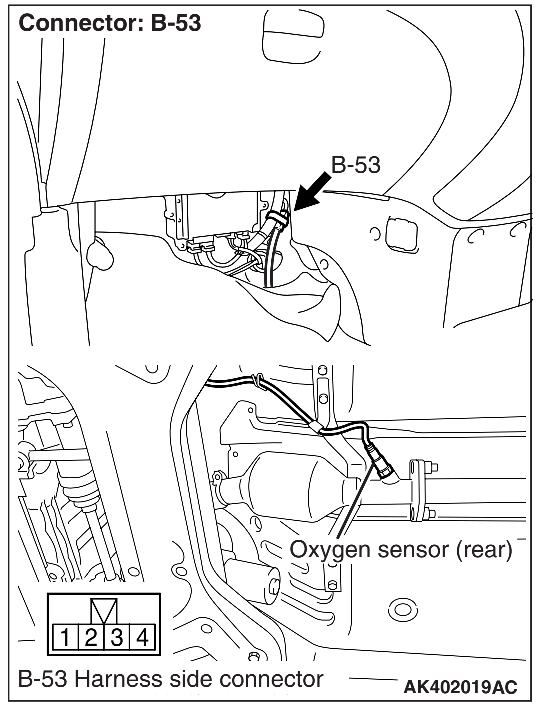
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-53 oxygen sensor (rear) connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at B-53 oxygen sensor (rear) connector.



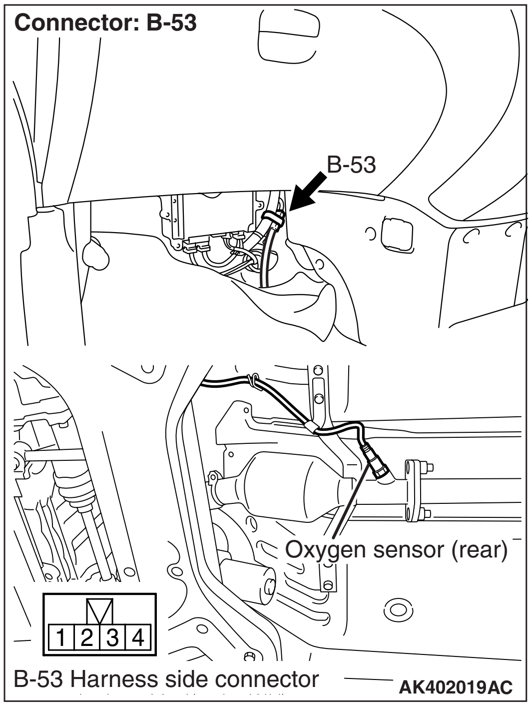
- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 3 and No. 4.

OK: 5 – 30 Ω (at 20°C)

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the oxygen sensor (rear).

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STEP 3. Perform voltage measurement at B-53 oxygen sensor (rear) connector.



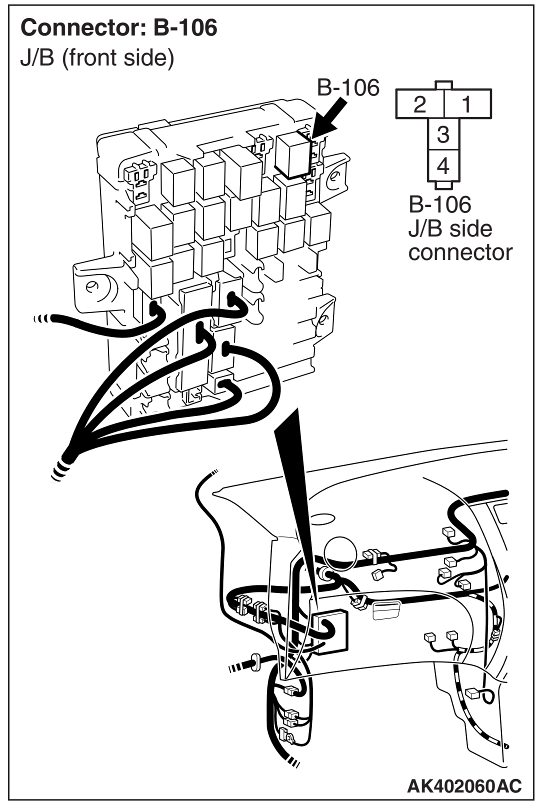
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

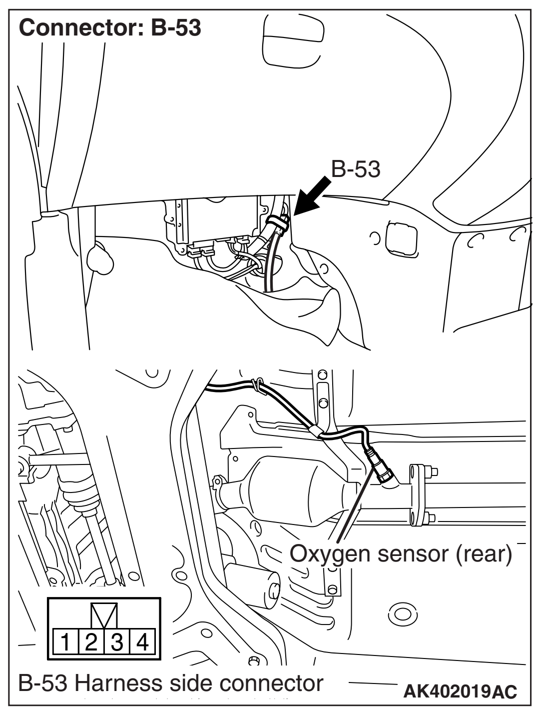
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Go to Step 4 .

STEP 4. Connector check: B-106 engine control relay connector





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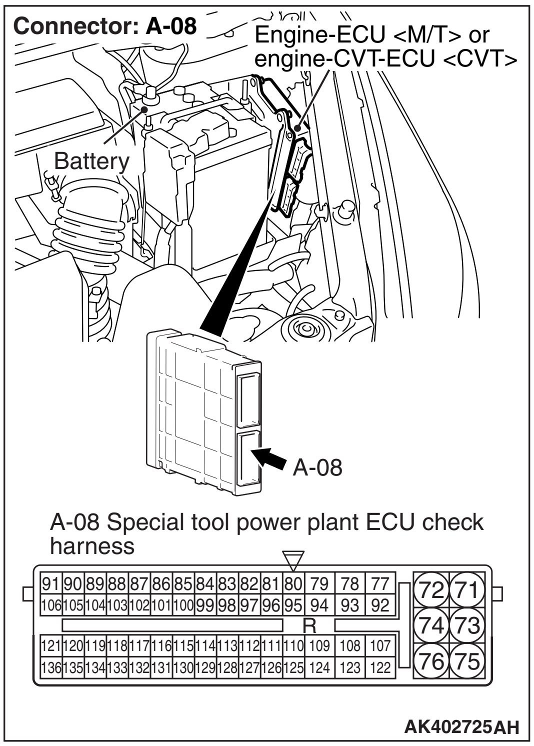
Q: Is the check result normal?

YES : Check intermediate connector B-112, and repair if necessary. If intermediate connector is normal, check and repair harness between B-53 (terminal No. 4) oxygen sensor (rear) connector and B-106 (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Ignition switch: ON
- Voltage between terminal No. 79 and earth.

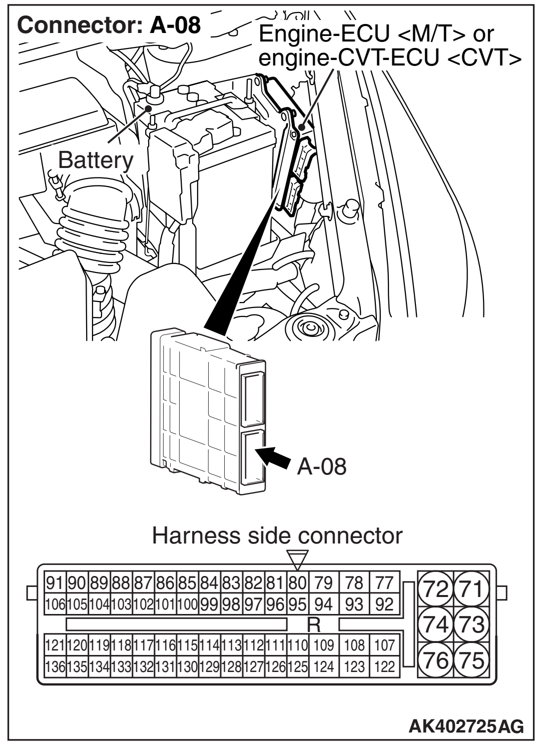
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 6 .

STEP 6. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



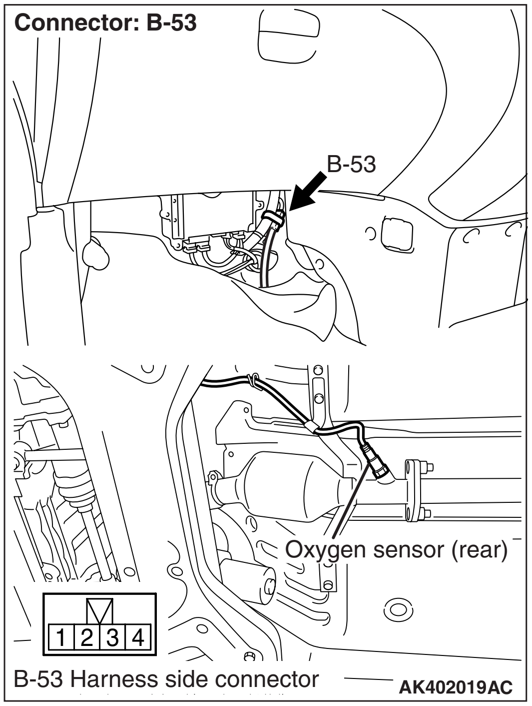
Q: Is the check result normal?

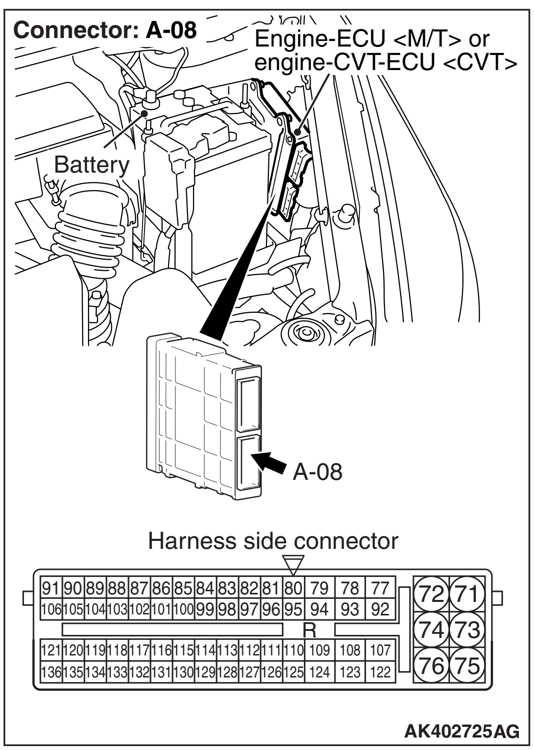
YES : Go to Step 7 .

NO : Repair or replace the connector.

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STEP 7. Check harness between B-53 (terminal No. 3) oxygen sensor (rear) connector and A-08 (terminal No. 79) engine-ECU connector or engine-CVT-ECU connector.





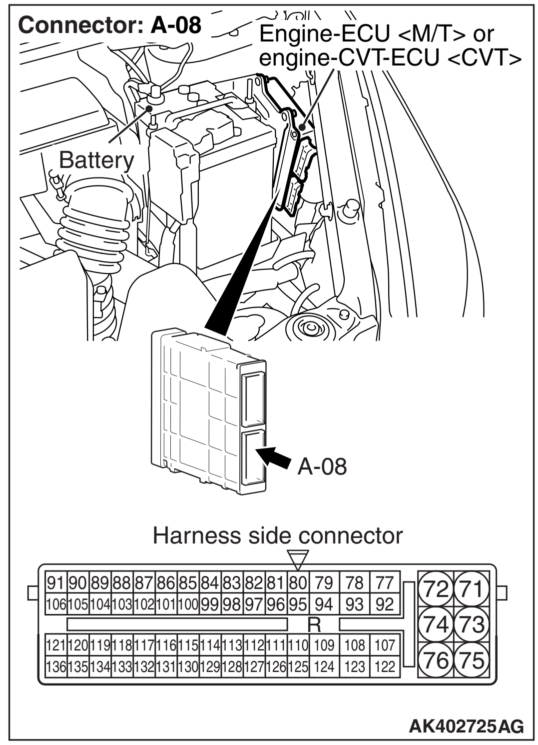
- Check earthing line for open/short circuit.

Q: Is the check result normal?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Repair the damaged harness wire.

STEP 8. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



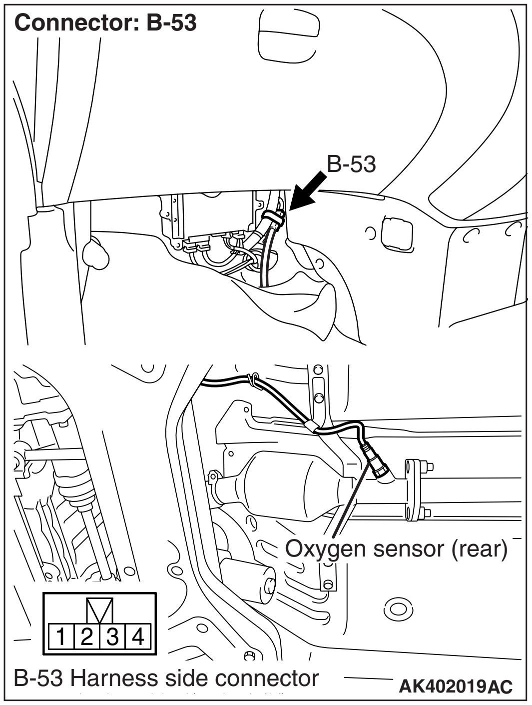
Q: Is the check result normal?

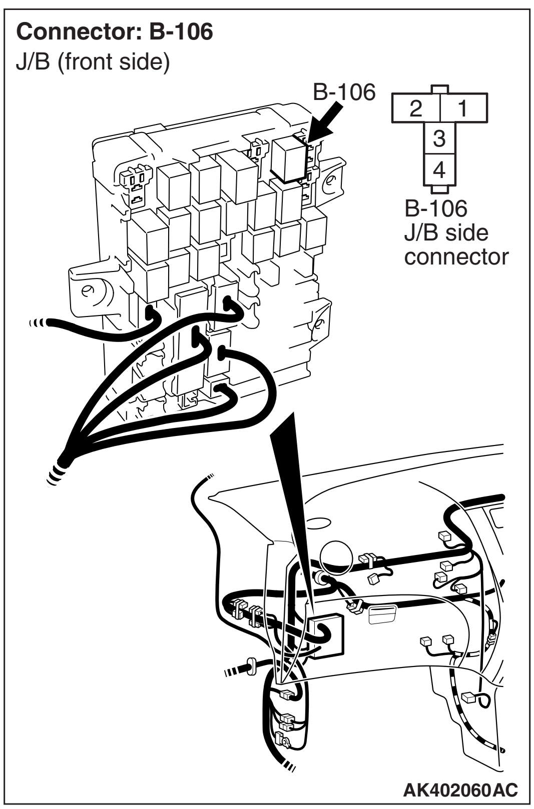
YES : Go to Step 9 .

NO : Repair or replace the connector.

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STEP 9. Check harness between B-53 (terminal No. 4) oxygen sensor (rear) connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector B-112, and repair if necessary.

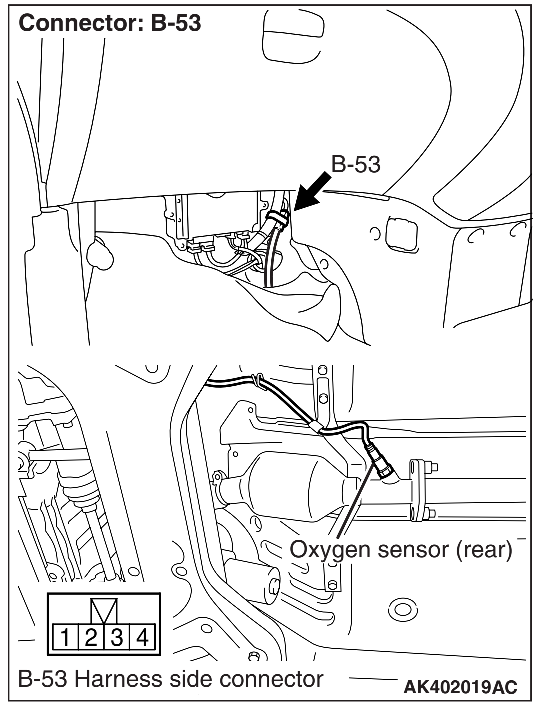
- Check power supply line for damage.

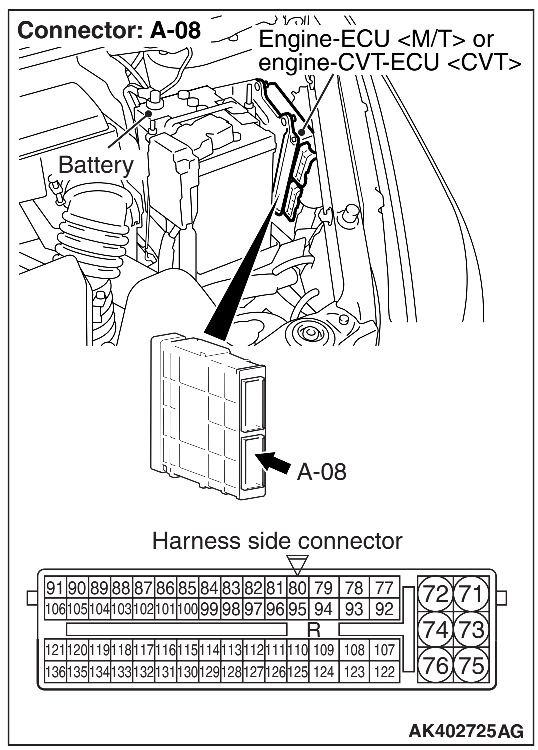
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

STEP 10. Check harness between B-53 (terminal No. 3) oxygen sensor (rear) connector and A-08 (terminal No. 79) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair the damaged harness wire.

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STEP 11. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0170: Abnormal Fuel System

OPERATION

- Refer to Code No. P0201: No. 1 Injector System P.13A-89.
- Refer to Code No. P0202: No. 2 Injector System P.13A-94.
- Refer to Code No. P0203: No. 3 Injector System P.13A-99.
- Refer to Code No. P0204: No. 4 Injector System P.13A-104.

FUNCTION

- If the fuel system goes out of order, the fuel correction value will become larger.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks whether the fuel trim value is within a specified range.

TROUBLE JUDGMENT

Check Condition

- In learning the air-fuel ratio

Judgment Criteria

- The correction value of fuel injection amount is too low for 5 seconds or more.

or

- The correction value of fuel injection amount is too high for 5 seconds or more.

PROBABLE CAUSES

- Failed fuel supply system
- Failed oxygen sensor
- Failed intake air temperature sensor
- Failed engine coolant temperature sensor
- Failed manifold absolute pressure sensor
- Failed barometric pressure sensor
- Air drawn in from intake hose and inlet manifold
- Exhaust leak from exhaust manifold
- Contamination of throttle body (throttle valve portion)
- Failed injector
- Failed purge control solenoid valve
- Failed EGR valve <CVT>
- Failed fuel pressure
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is any other diagnosis code than P0170 output?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 13: Intake air temperature sensor
  b. Item 21: Engine coolant temperature sensor
  c. Item 25: Barometric pressure sensor
  d. Item 32: Manifold absolute pressure sensor

Q: Are the check results normal?

YES : Go to Step 3 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Check for intake of air from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

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STEP 4. Check for leakage of exhaust emission from exhaust manifold.

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Repair.

STEP 5. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

STEP 6: M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 11: Oxygen sensor (front)

Q: Is the check result normal?

YES : Go to Step 7 .
NO : Check oxygen sensor (front) (Refer to Code No. P0130 P.13A-62).

STEP 7. Check Injector itself.

- Check Injector itself (Refer to P.13A-364).

Q: Is the check result normal?

YES : Go to Step 8 .
NO : Replace injector.

STEP 8. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System – Purge Control Solenoid Valve P.17-16).

Q: Is the check result normal?

YES : Go to Step 9 <CVT> , go to Step 10 <M/T> .
NO : Replace purge control solenoid valve.

STEP 9. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check P.17-20).

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Replace EGR valve (stepper motor).

STEP 10. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

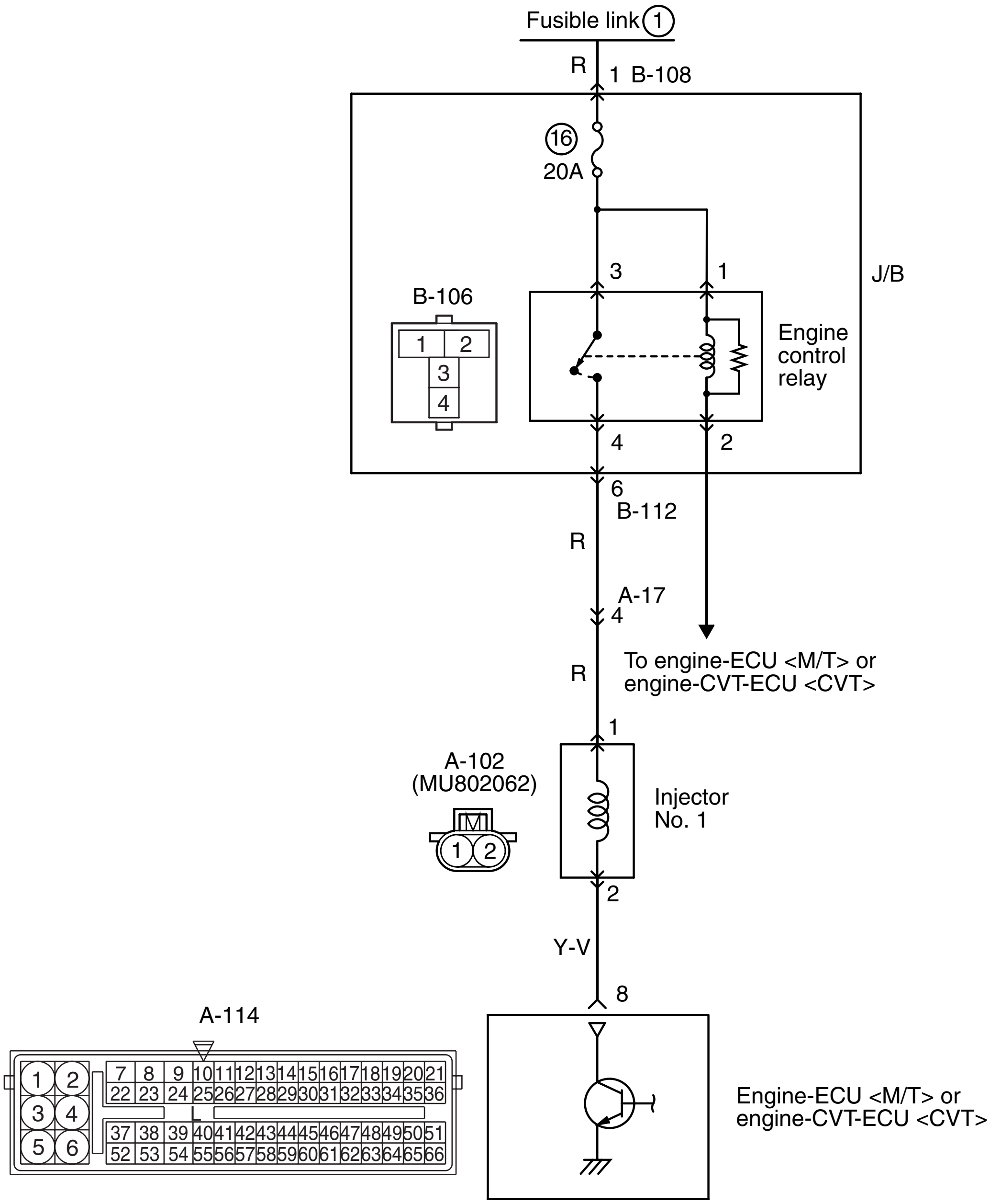
Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Repair.

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Code No. P0201: No. 1 Injector System

No. 1 Injector Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402684AJ

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 8) makes the power transistor in the unit be in ON position, and that makes currents go on the injector (terminal No. 2).

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is between 50 and 1000 r/min.
- Throttle position sensor (main) output is 1.0 V or less.
- Injector operation (by carrying out actuator test) is not in progress.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage +2 V) has not been detected for 4 seconds.

PROBABLE CAUSES

- Failed No. 1 injector
- Open/short circuit in No. 1 injector circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III actuator test

- Item 01: No. 1 injector

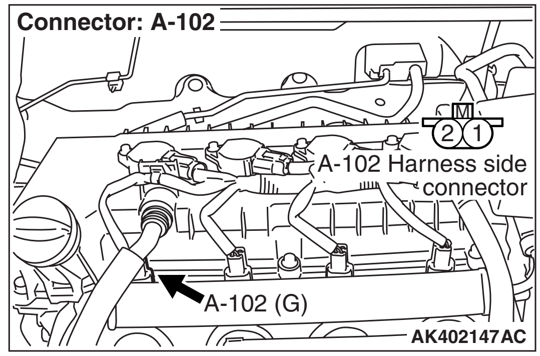
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-102 No. 1 injector connector

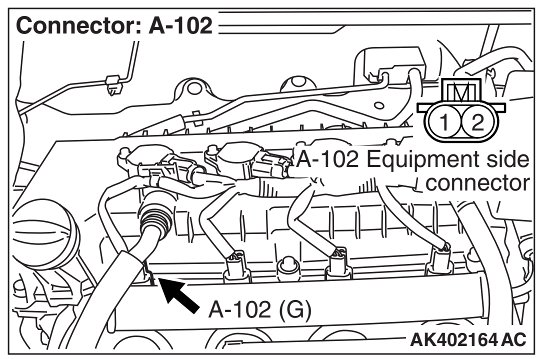


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-102 No. 1 injector connector.



- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.

OK: 14 – 15 Ω (at 20°C)

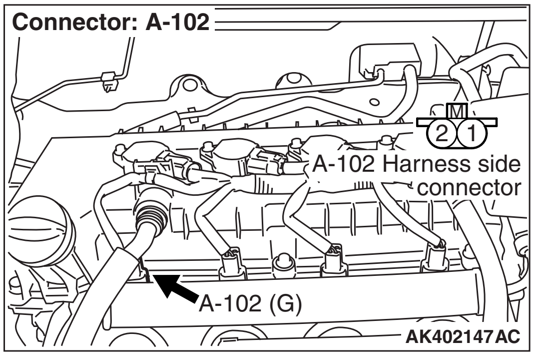
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 1 injector.

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STEP 4. Perform voltage measurement at A-102 No. 1 injector connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

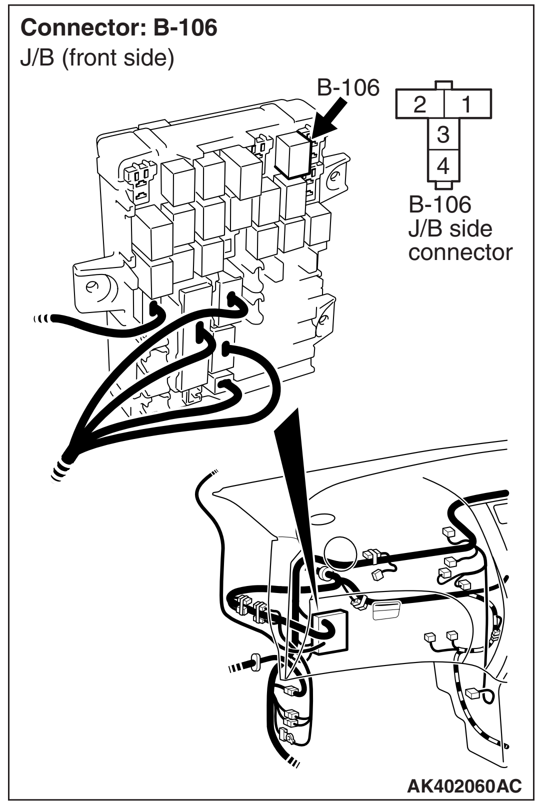
OK: System voltage

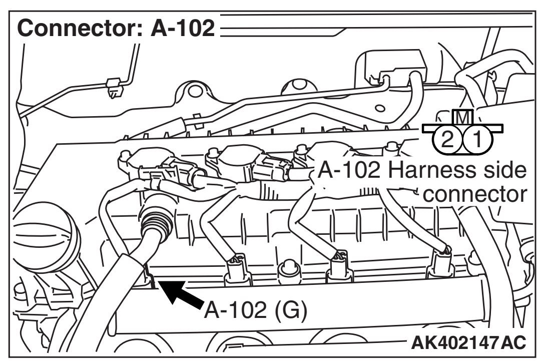
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-106 engine control relay connector





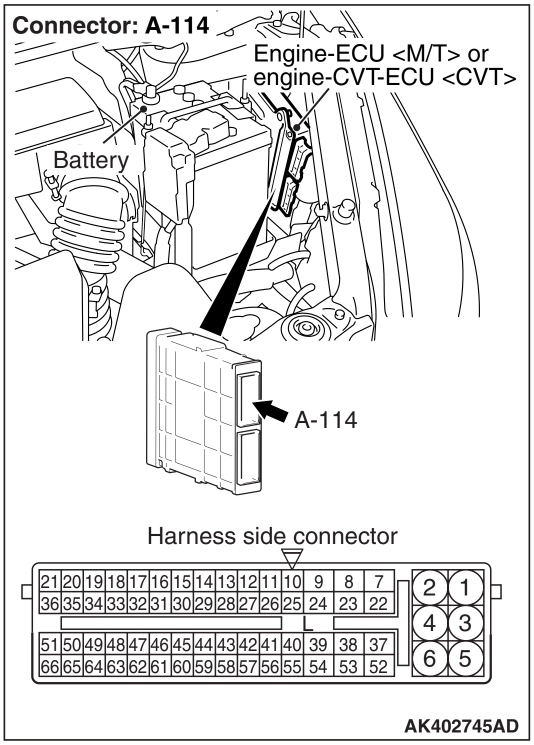
Q: Is the check result normal?

YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-106 (terminal No. 4) engine control relay connector and A-102 (terminal No. 1) No. 1 injector connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

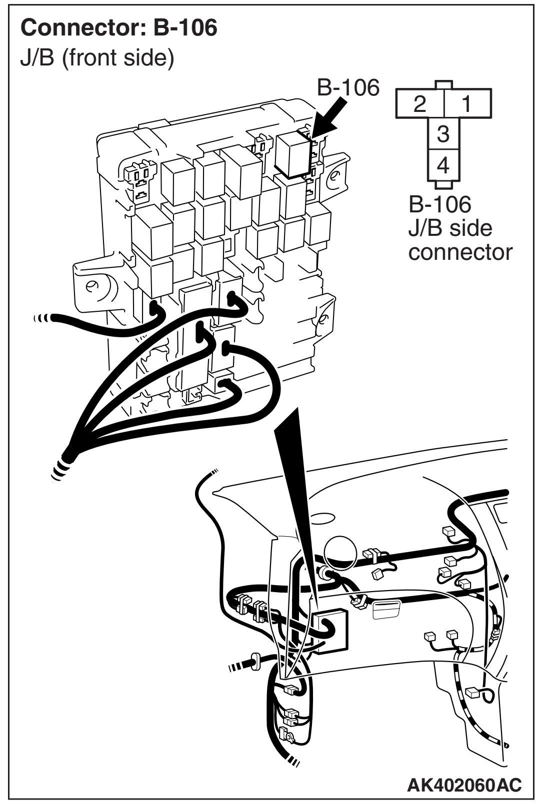


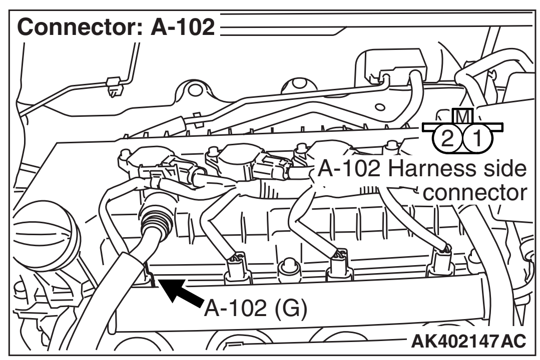
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-106 (terminal No. 4) engine control relay connector and A-102 (terminal No. 1) No. 1 injector connector.





NOTE: Before checking harness, check intermediate connectors A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

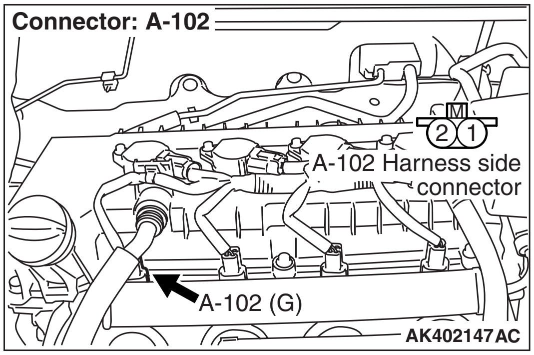
Q: Is the check result normal?

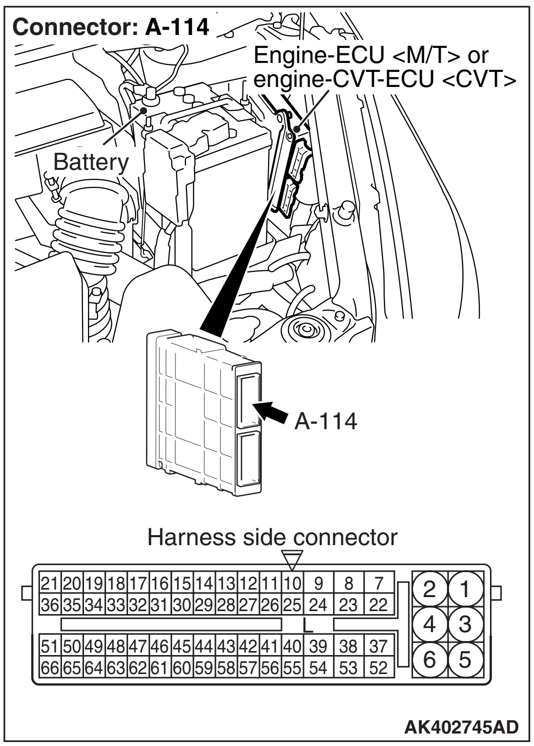
YES : Go to Step 8 .

NO : Repair the damaged harness wire.

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STEP 8. Check harness between A-102 (terminal No. 2) No. 1 injector connector and A-114 (terminal No. 8) engine-ECU connector or engine-CVT-ECU connector.





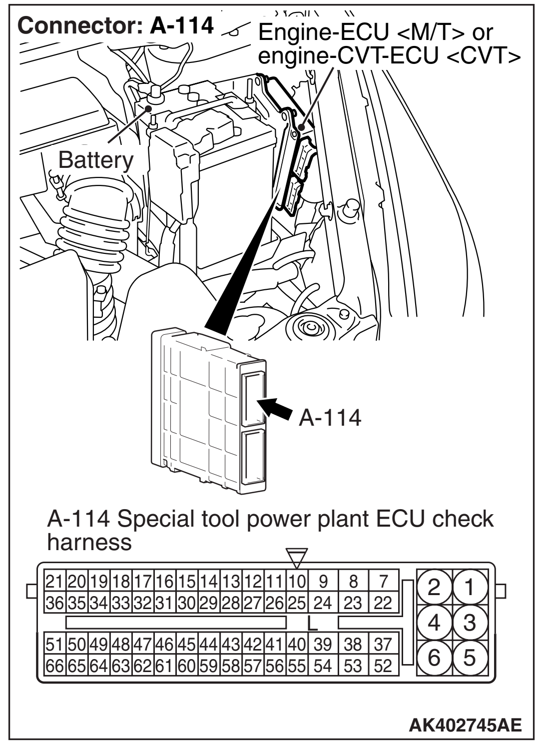
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Perform signal wave pattern measurement at A-114 engine-ECU connector or engine-CVT-ECU connector (Using an oscilloscope).



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 8 and earth.

OK: Waveforms should be display on Inspection procedure using an oscilloscope (Refer to P.13A-348).

Q: Is the check result normal?

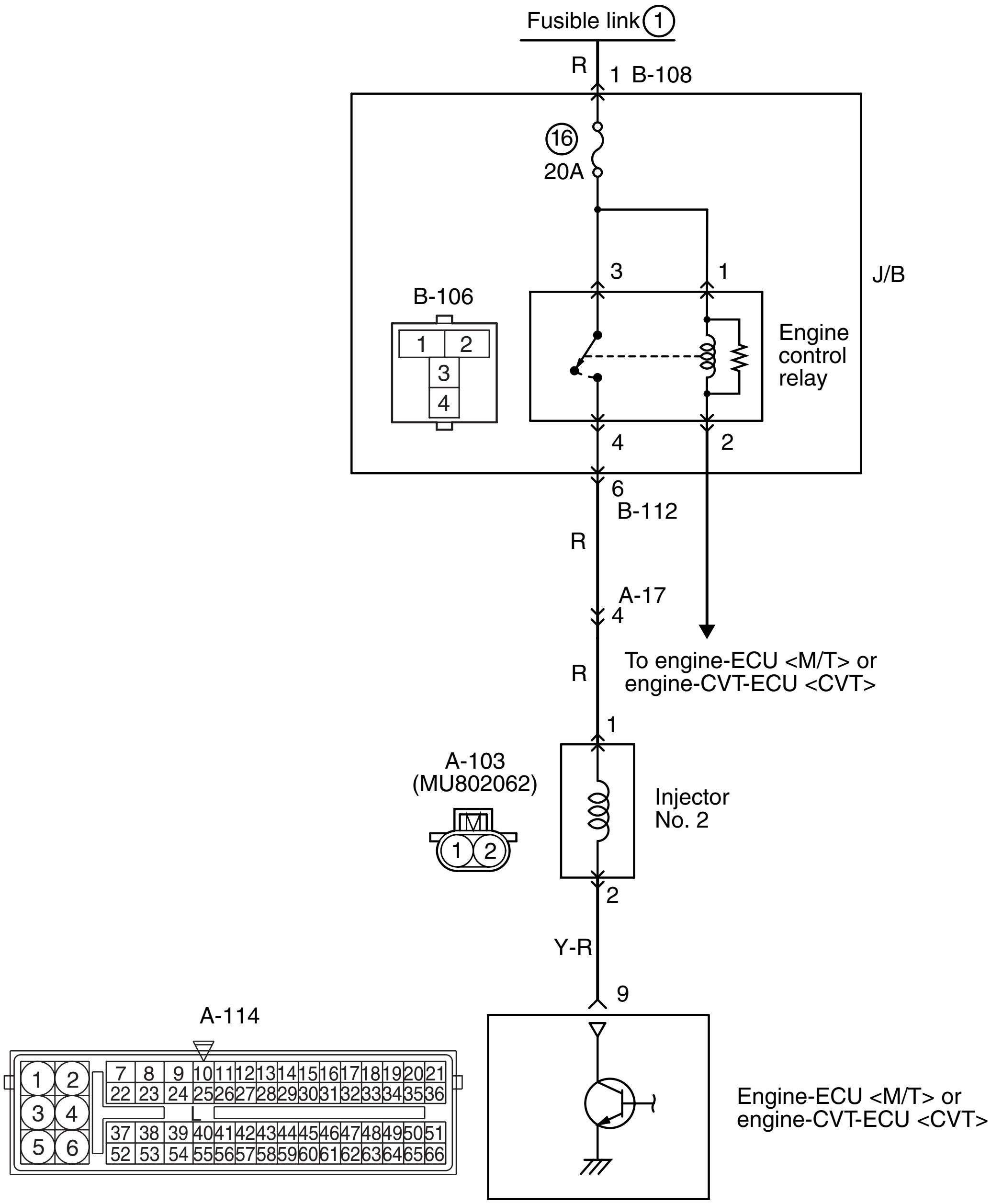
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P0202: No. 2 Injector System

No. 2 Injector Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402684AK

Main Index
Group TOC

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU connector or engine-CVT-ECU connector (terminal No. 9) makes the power transistor in the unit be in ON position, and that makes currents go on the injector (terminal No. 2).

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is between 50 and 1,000 r/min.
- Throttle position sensor (main) output is 1.0 V or less.
- Injector operation (by carrying out actuator test) is not in progress.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage +2 V) has not been detected for 4 seconds.

PROBABLE CAUSES

- Failed No. 2 injector
- Open/short circuit in No. 2 injector circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III actuator test

- Item 02: No. 2 injector

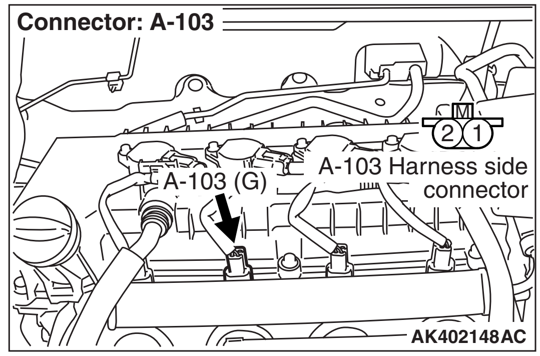
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-103 No. 2 injector connector

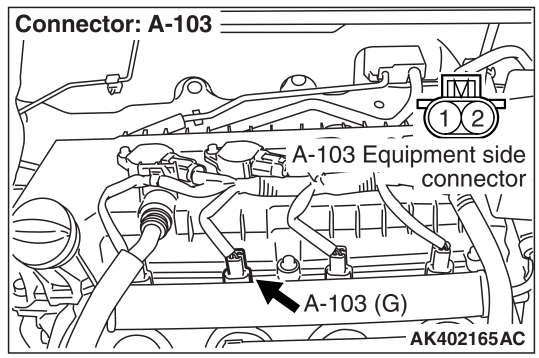


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-103 No. 2 injector connector.



- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.

OK: 14 – 15 Ω (at 20°C)

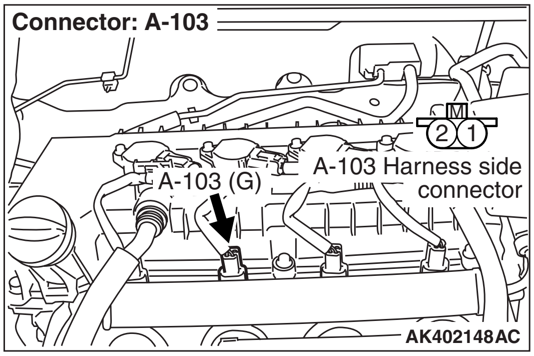
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 2 injector.

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STEP 4. Perform voltage measurement at A-103 No. 2 injector connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

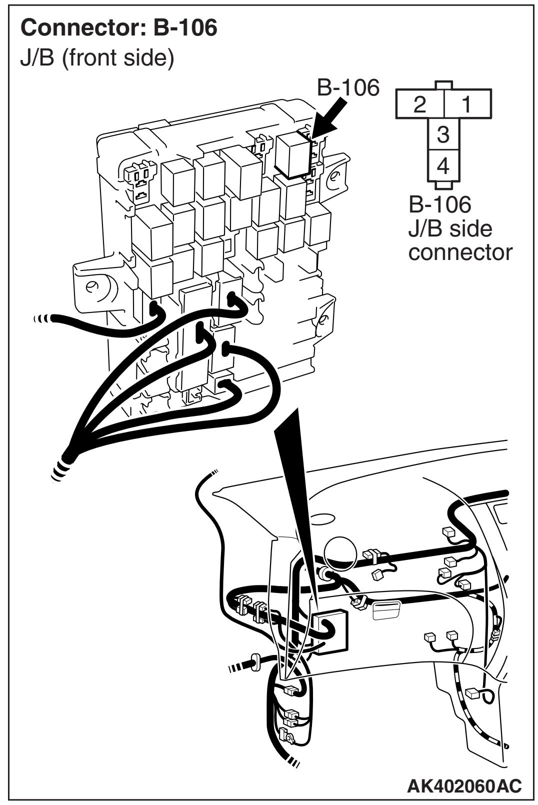
OK: System voltage

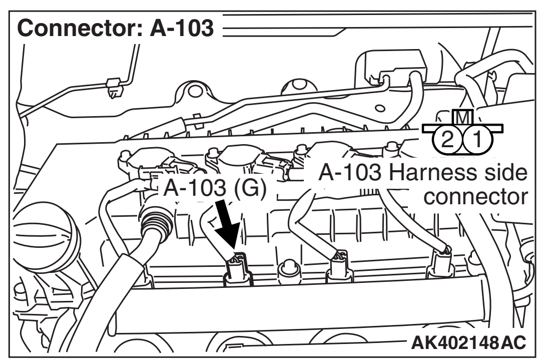
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-106 engine control relay connector





Q: Is the check result normal?

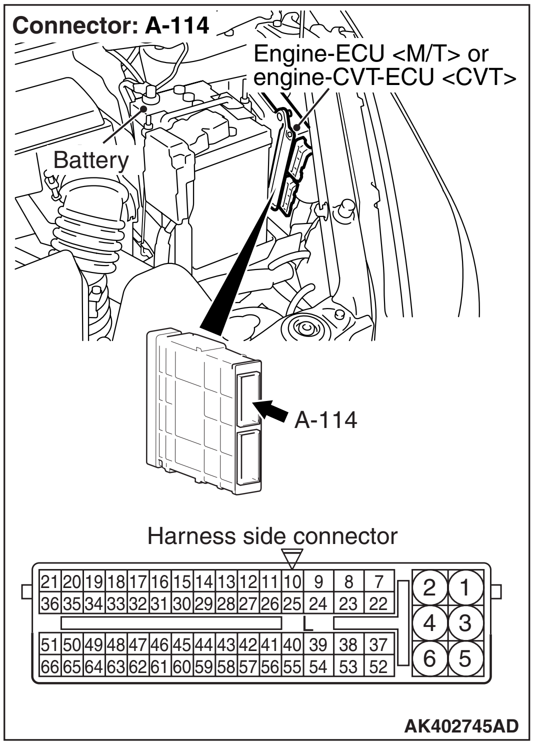
YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-106 (terminal No. 4) engine control relay connector and A-103 (terminal No. 1) No. 2 injector connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

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STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

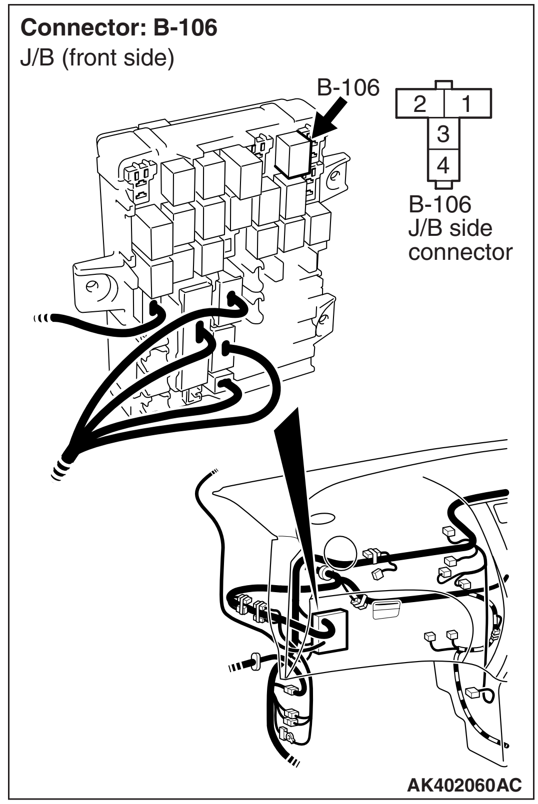


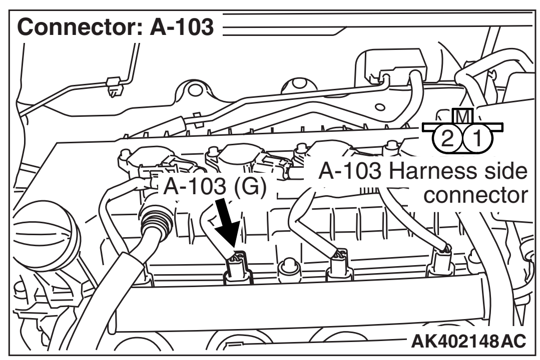
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-106 (terminal No. 4) engine control relay connector and A-103 (terminal No. 1) No. 2 injector connector.





NOTE: Before checking harness, check intermediate connectors A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

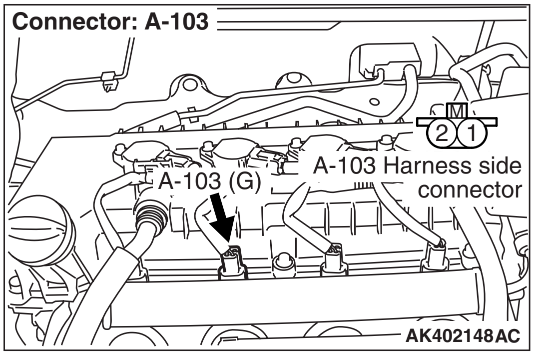
Q: Is the check result normal?

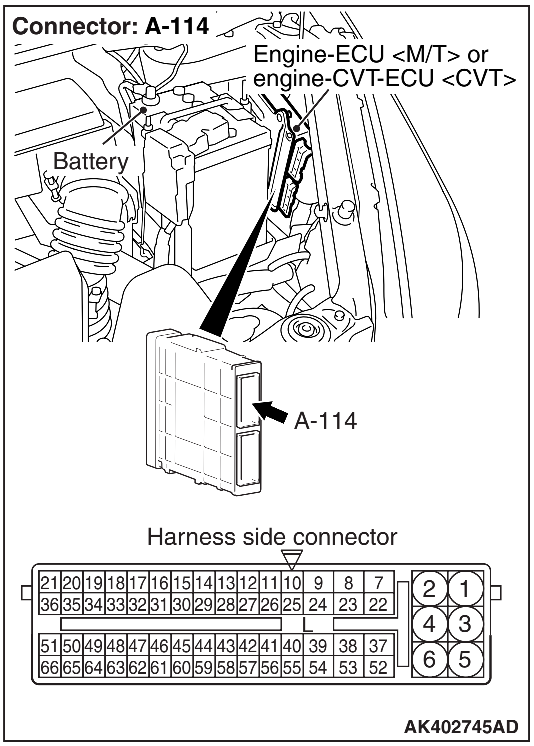
YES : Go to Step 8 .

NO : Repair the damaged harness wire.

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STEP 8. Check harness between A-103 (terminal No. 2) No. 2 injector connector and A-114 (terminal No. 9) engine-ECU connector or engine-CVT-ECU connector.





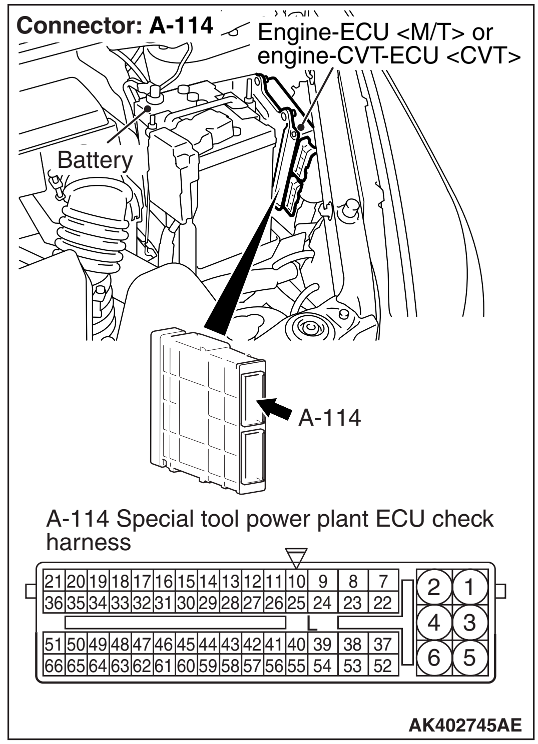
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Perform signal wave pattern measurement at A-114 engine-ECU connector or engine-CVT-ECU connector (Using an oscilloscope).



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 9 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13A-348).

Q: Is the check result normal?

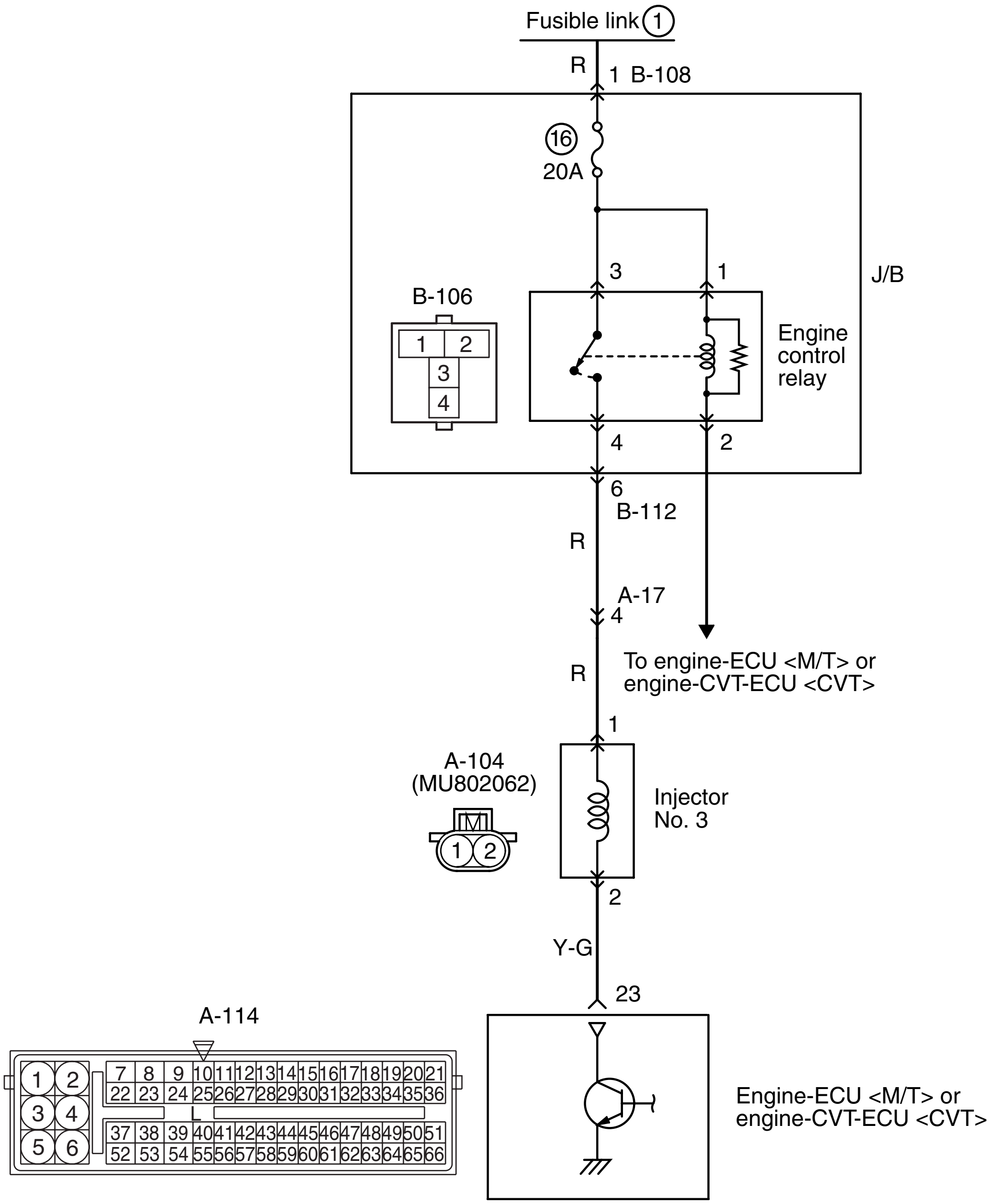
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Group TOC

Code No. P0203: No. 3 Injector System

No. 3 Injector Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402684AL

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Group TOC

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 23) makes the power transistor in the unit be in ON position, and that makes currents go on the injector (terminal No. 2).

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is between 50 and 1,000 r/min.
- Throttle position sensor (main) output is 1.0 V or less.
- Injector operation (by carrying out actuator test) is not in progress.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage +2 V) has not been detected for 4 seconds.

PROBABLE CAUSES

- Failed No. 3 injector
- Open/short circuit in No. 3 injector circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III actuator test

- Item 03: No. 3 injector

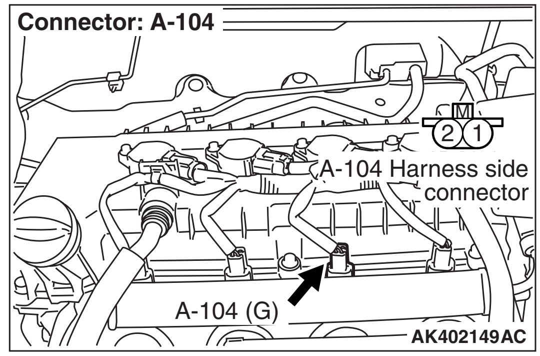
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-104 No. 3 injector connector

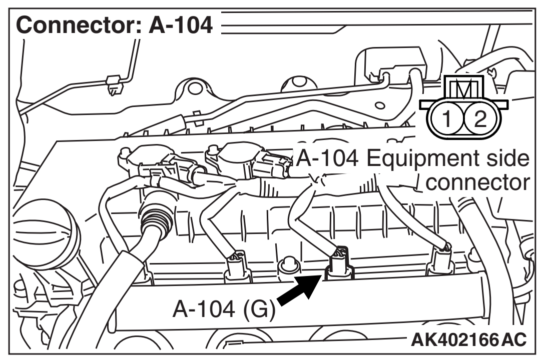


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-104 No. 3 injector connector.



- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.

OK: 14 – 15 Ω (at 20°C)

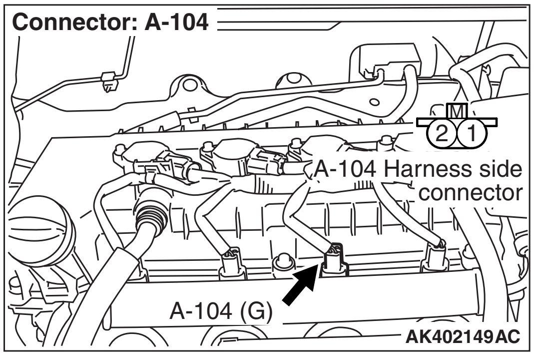
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 3 injector.

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Group TOC

STEP 4. Perform voltage measurement at A-104 No. 3 injector connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

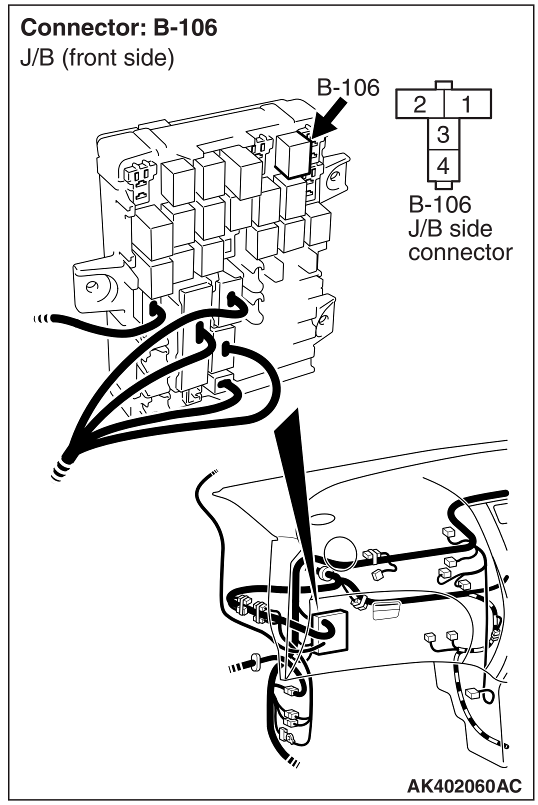
OK: System voltage

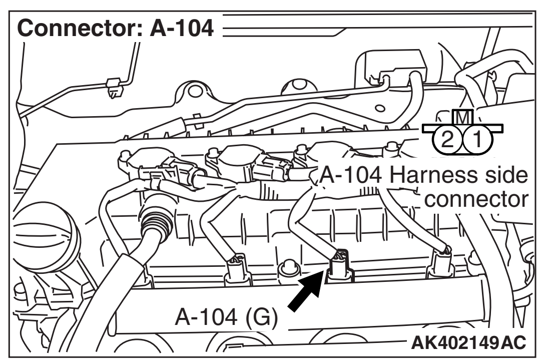
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-106 engine control relay connector





Q: Is the check result normal?

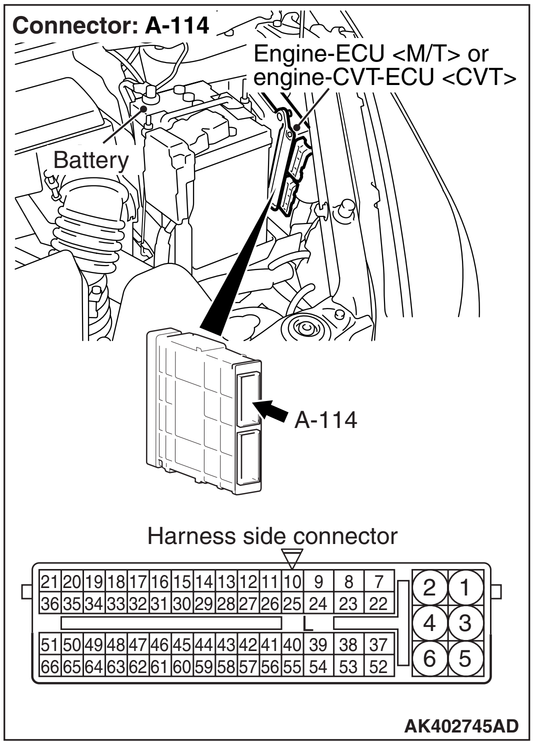
YES : Check intermediate connectors A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-106 (terminal No. 4) engine control relay connector and A-104 (terminal No. 1) No. 3 injector connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

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STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

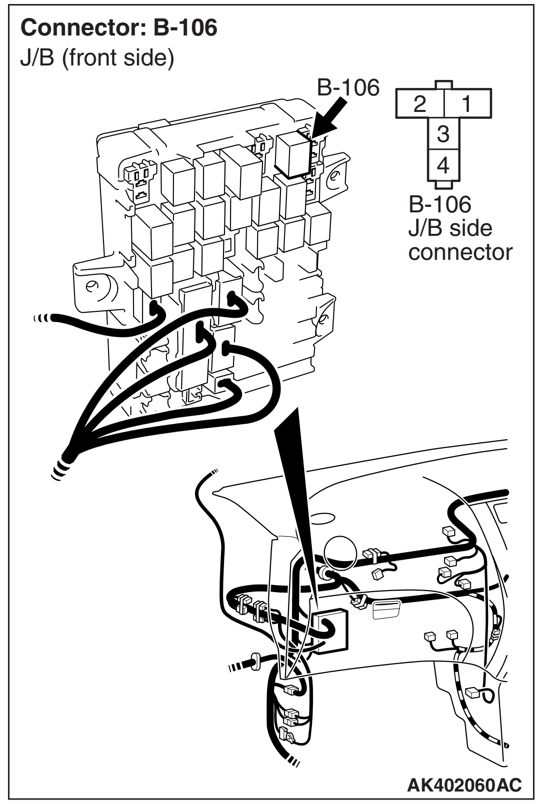


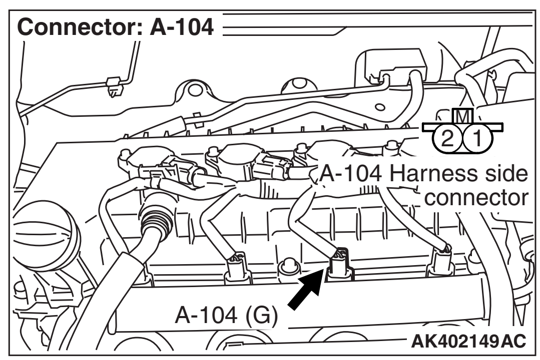
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-106 (terminal No. 4) engine control relay connector and A-104 (terminal No. 1) No. 3 injector connector.





NOTE: Before checking harness, check intermediate connectors A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

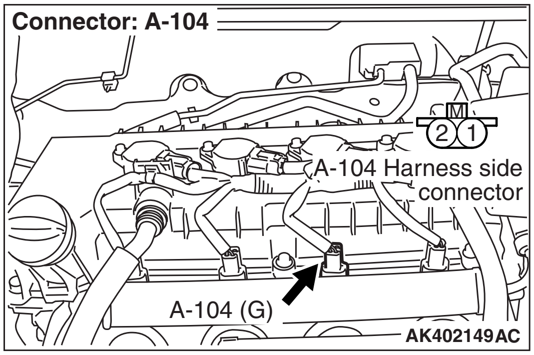
Q: Is the check result normal?

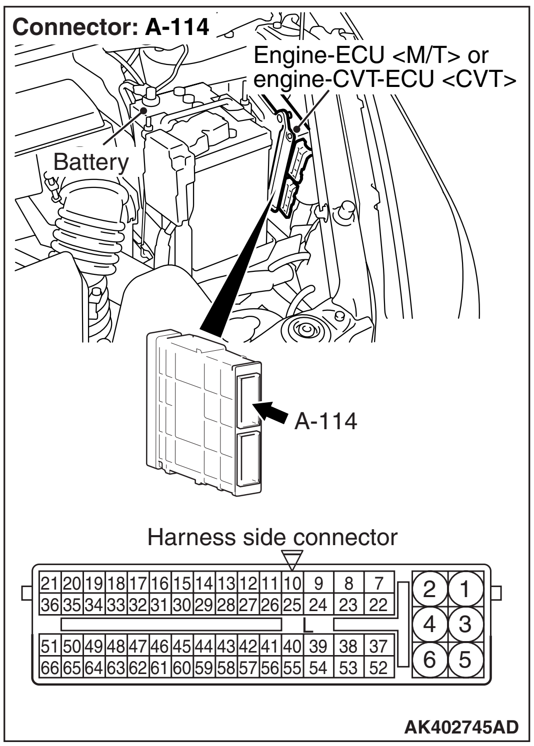
YES : Go to Step 8 .

NO : Repair the damaged harness wire.

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STEP 8. Check harness between A-104 (terminal No. 2) No. 3 injector connector and A-114 (terminal No. 23) engine-ECU connector or engine-CVT-ECU connector.





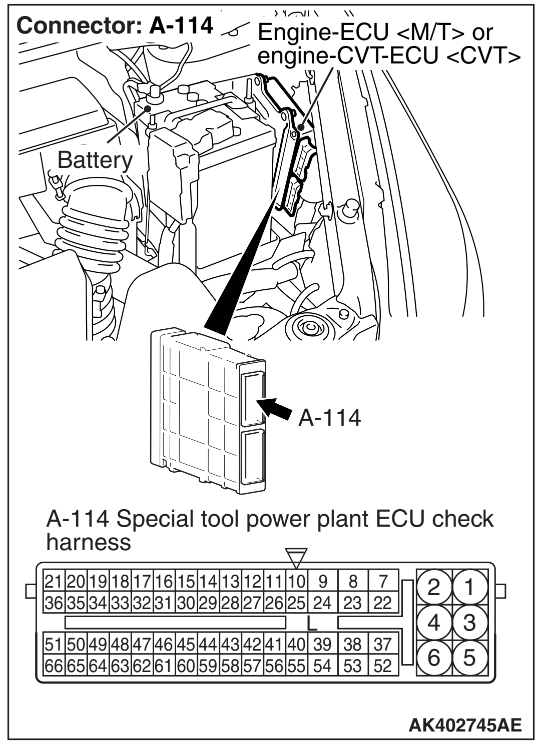
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Perform signal wave pattern measurement at A-114 engine-ECU connector or engine-CVT-ECU connector (Using on oscilloscope).



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 23 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13A-348).

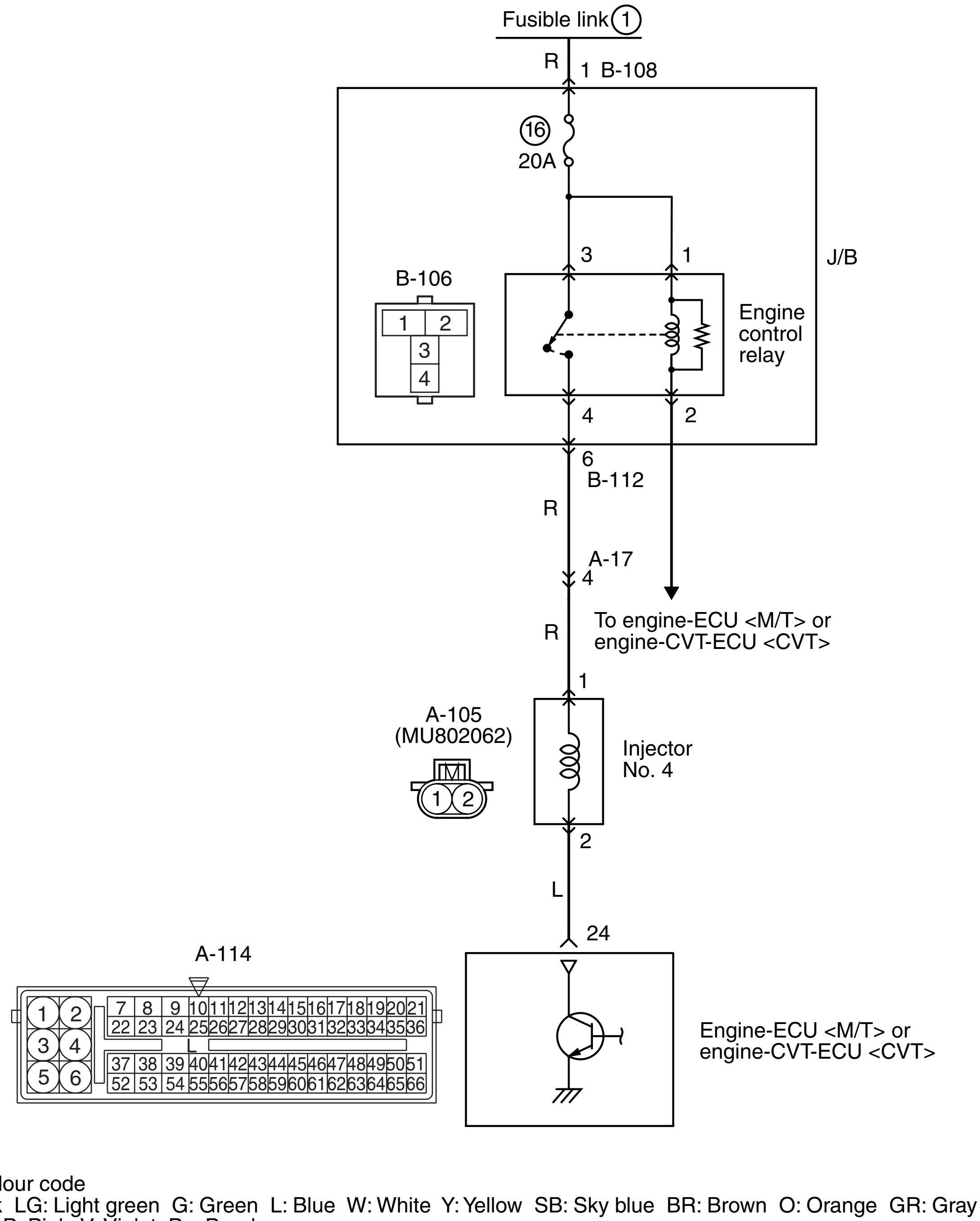
Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

Code No. P0204: No. 4 Injector System

No. 4 Injector Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402684AM

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Group TOC

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 24) makes the power transistor in the unit be in ON position, and that makes currents go on the injector (terminal No. 2).

FUNCTION

- The engine-ECU connector or engine-CVT-ECU connector controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is between 50 and 1000 r/min.
- Throttle position sensor (main) output is 1.0 V or less.
- Injector operation (by carrying out actuator test) is not in progress.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage +2 V) has not been detected for 4 seconds.

PROBABLE CAUSES

- Failed No. 4 injector
- Open/short circuit in No. 4 injector circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III actuator test

- Item 04: No. 4 injector

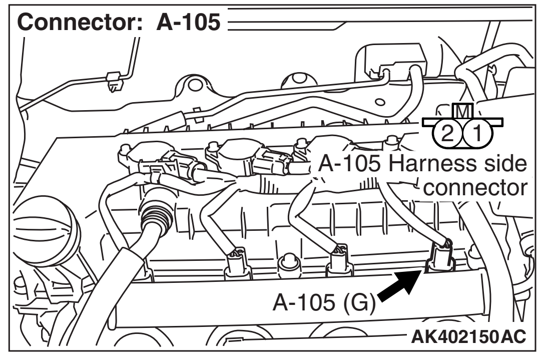
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-105 No. 4 injector connector

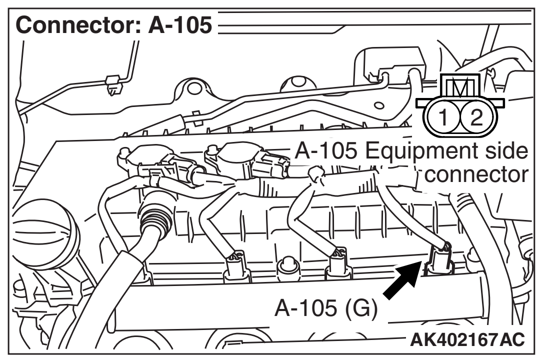


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-105 No. 4 injector connector.



- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.

OK: 14 – 15 Ω (at 20°C)

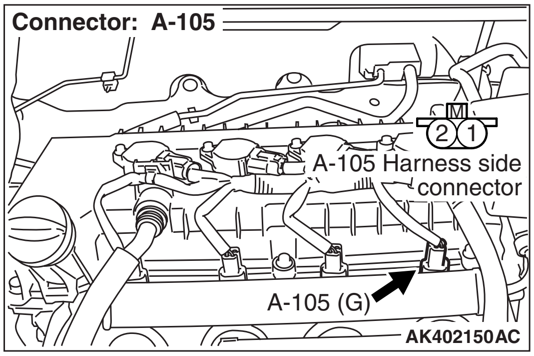
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 4 injector.

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Group TOC

STEP 4. Perform resistance measurement at A-105 No. 4 injector connector.



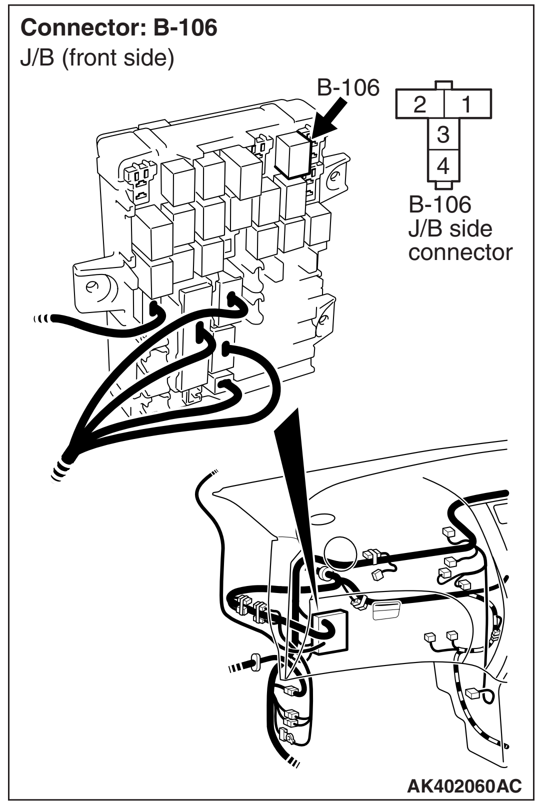
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

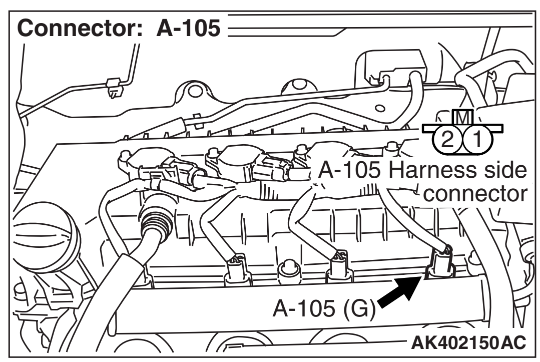
  OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Go to Step 5 .

STEP 5. Connector check: B-106 engine control relay connector





Q: Is the check result normal?

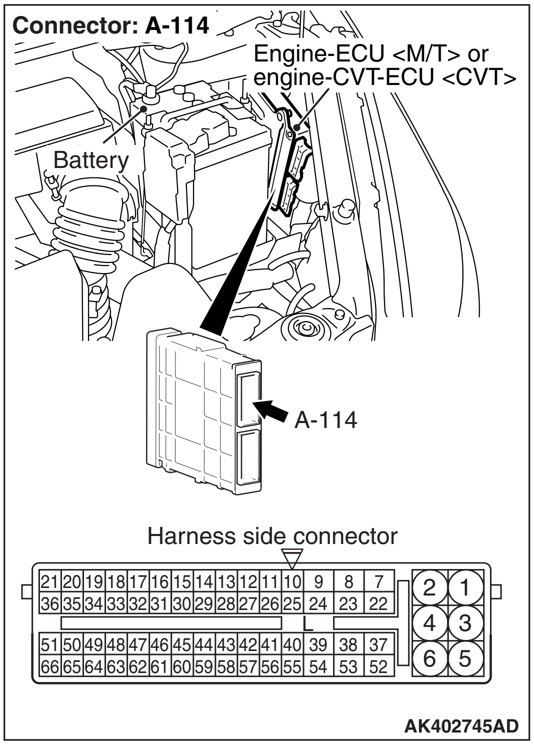
YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-106 (terminal No. 4) engine control relay connector and A-105 (terminal No. 1) No. 4 injector connector.

- Check power supply line for open/short circuit and damage.

NO : Repair or replace the connector.

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STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

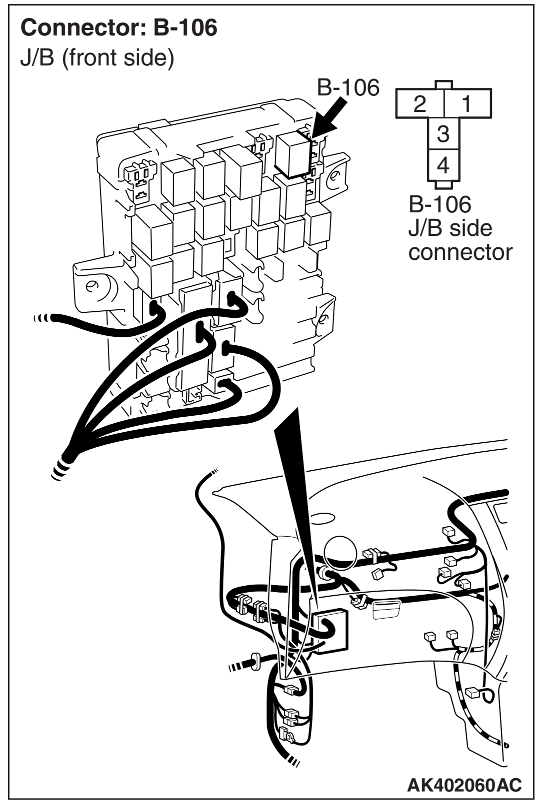


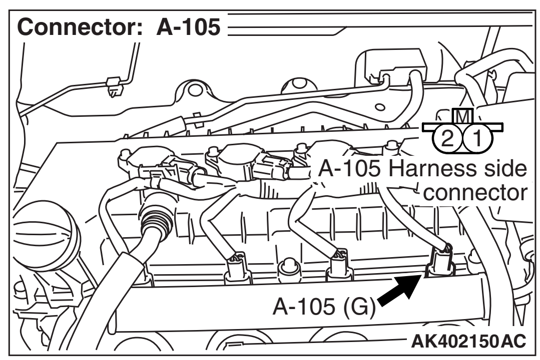
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-106 (terminal No. 4) engine control relay connector and A-105 (terminal No. 1) No. 4 injector connector.





NOTE: Before checking harness, check intermediate connectors A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

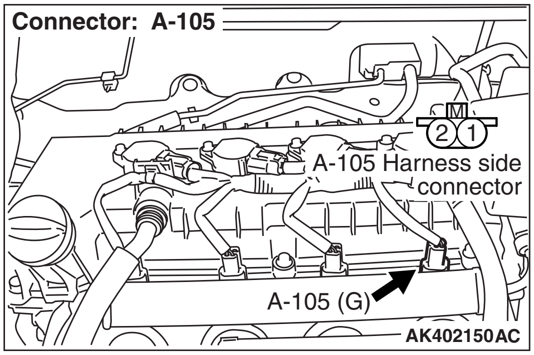
Q: Is the check result normal?

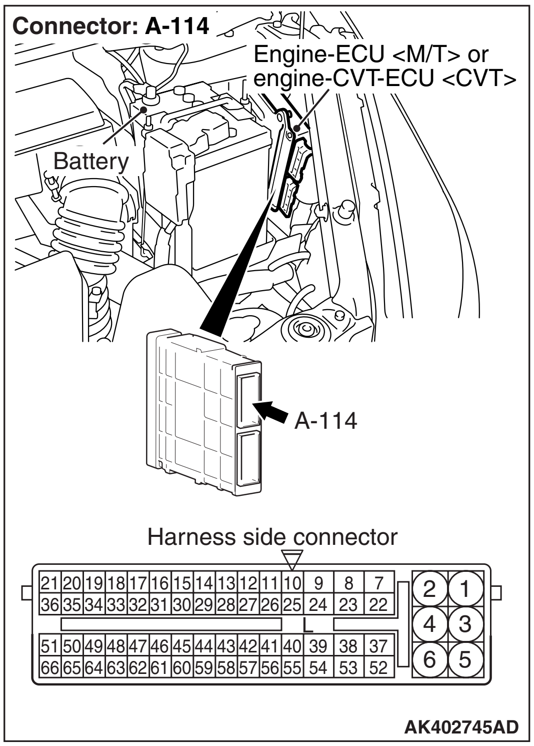
YES : Go to Step 8 .

NO : Repair the damaged harness wire.

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Group TOC

STEP 8. Check harness between A-105 (terminal No. 2) No. 4 injector connector and A-114 (terminal No. 24) engine-ECU connector or engine-CVT-ECU connector.





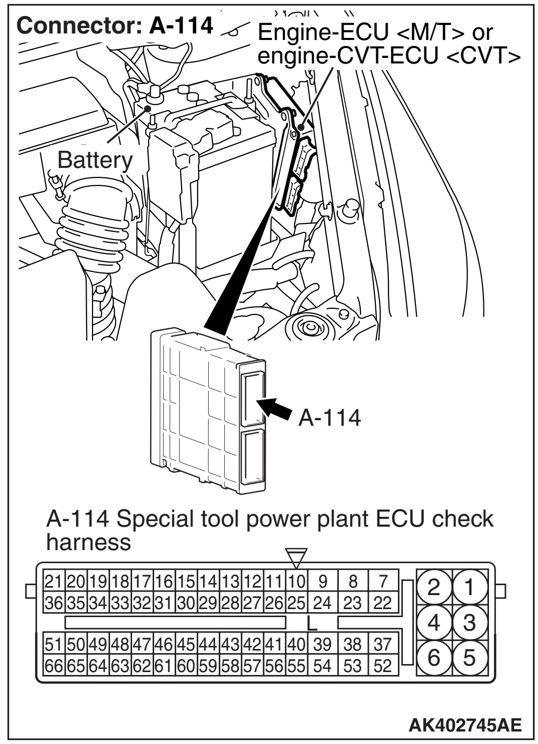
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Perform signal wave pattern measurement at A-114 engine-ECU connector or engine-CVT-ECU connector (Using an oscilloscope).



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 24 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13A-348).

Q: Is the check result normal?

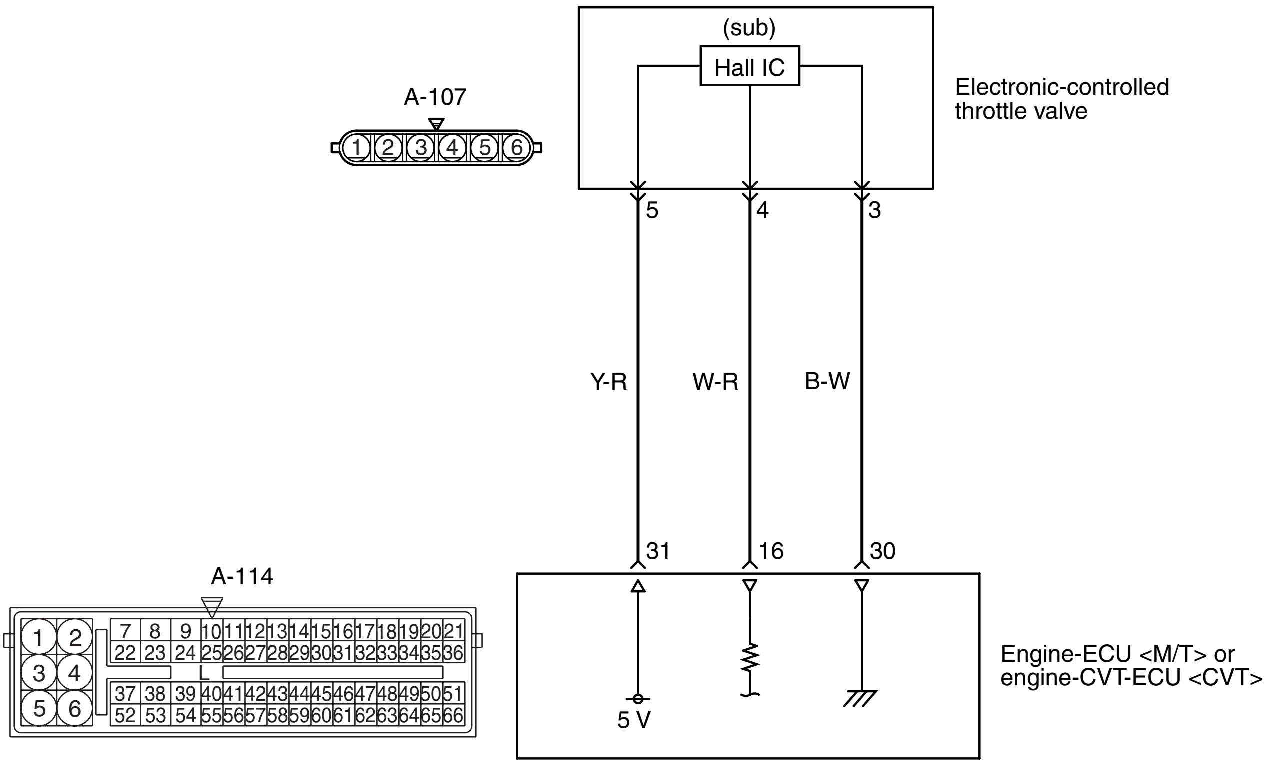
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Group TOC

Code No. P0222: Throttle Position Sensor (Sub) Circuit Low Input

Throttle Position Sensor (sub) Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402686AE

OPERATION

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 31).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 30) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 16) from the electronic-controlled throttle valve output terminal (terminal No. 4).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the throttle valve position.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Throttle position sensor (sub) output voltage is 0.2 V or less <M/T>.
- Throttle position sensor (sub) output voltage is 0.2 V or less for 0.5 second <CVT>.

PROBABLE CAUSES

- Failed throttle position sensor (sub)
- Open/short circuit in throttle position sensor (sub) circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

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DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

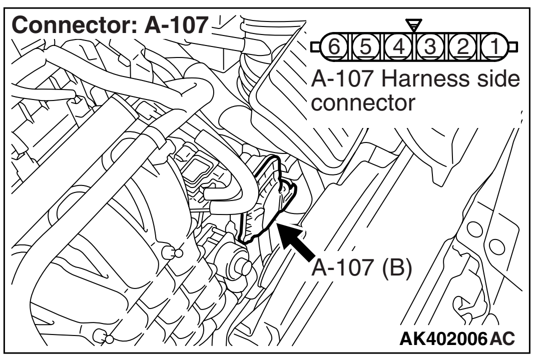
- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-107 electronic-controlled throttle valve connector

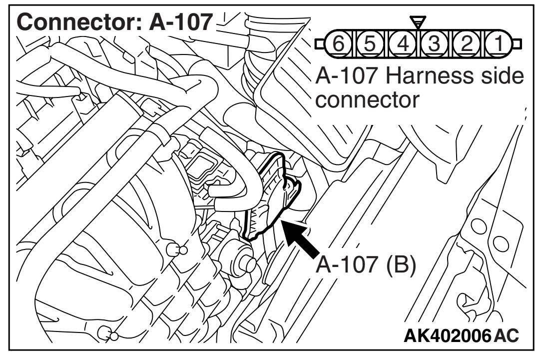


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at A-107 electronic-controlled throttle valve connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 5 and earth.

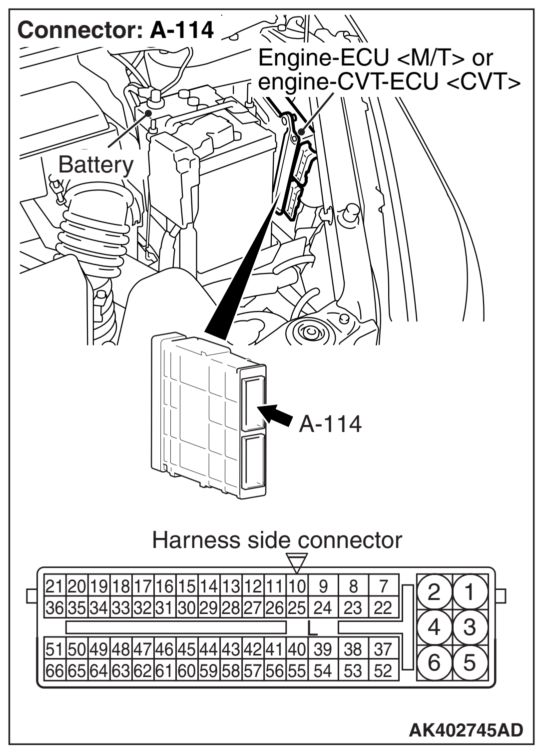
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



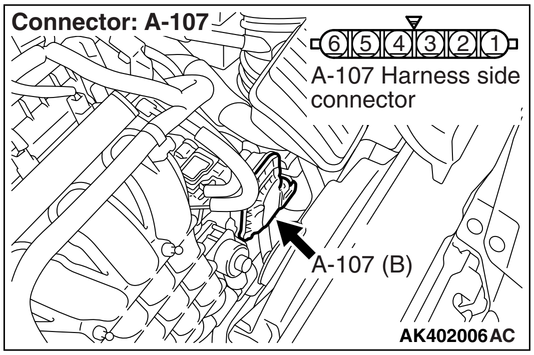
Q: Is the check result normal?

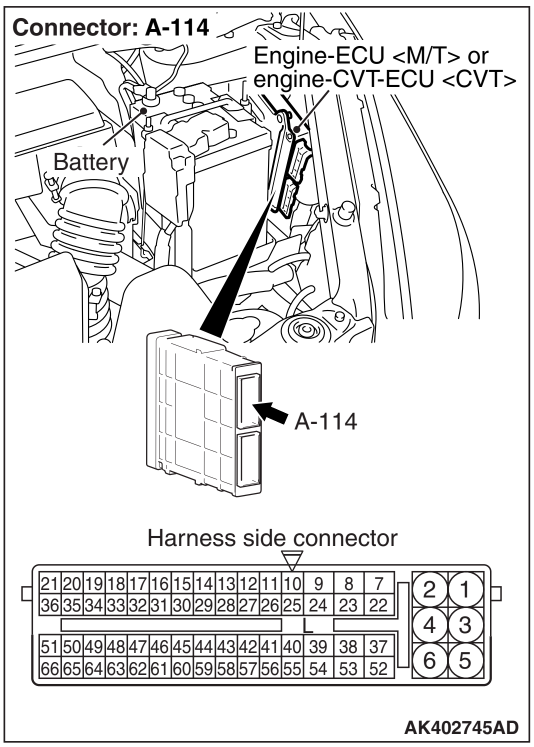
YES : Go to Step 5 .

NO : Repair or replace the connector.

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STEP 5. Check harness between A-107 (terminal No. 5) electronic-controlled throttle valve connector and A-114 (terminal No. 31) engine-ECU connector or engine-CVT-ECU connector.





- Check power supply line for open/short circuit.

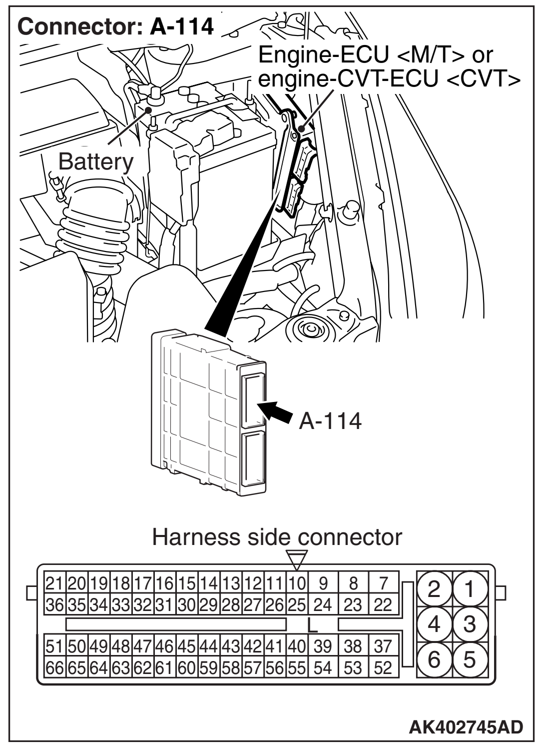
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

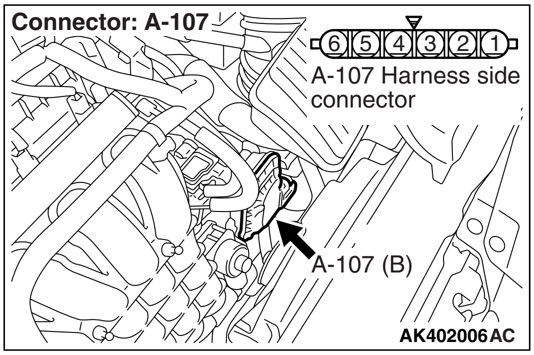
STEP 7. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

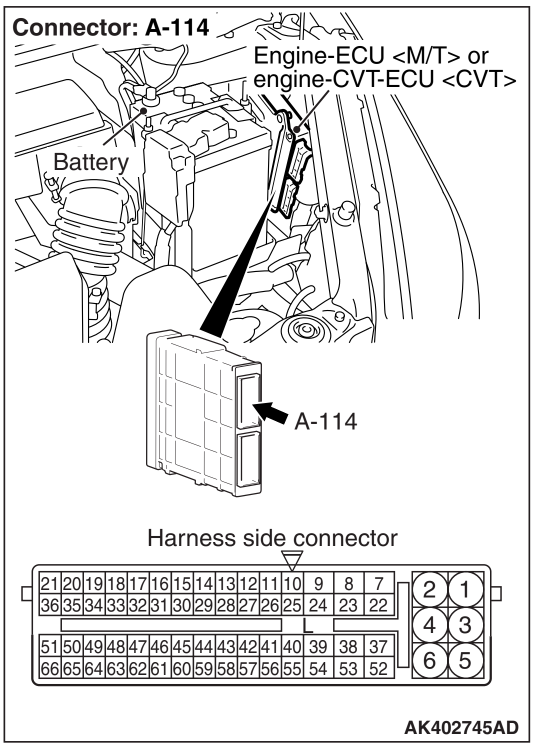


Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair or replace the connector.

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STEP 8. Check harness between A-107 (terminal No. 5) electronic-controlled throttle valve connector and A-114 (terminal No. 31) engine-ECU connector or engine-CVT-ECU connector.





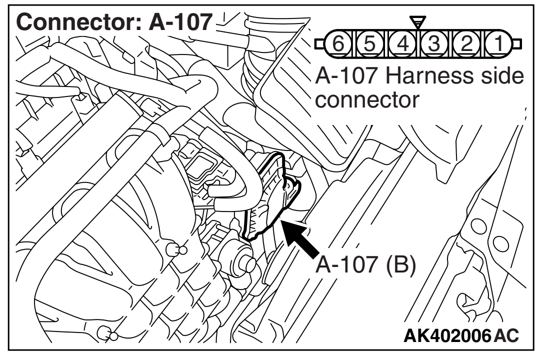
- Check power supply line for damage.

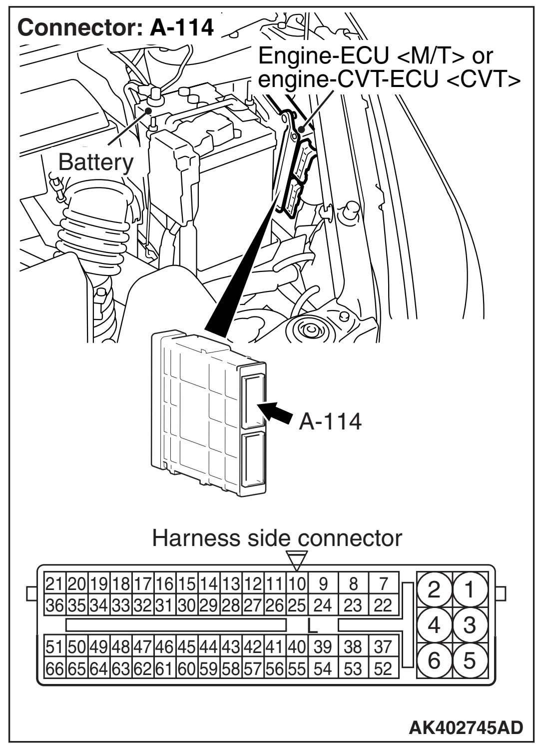
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Check harness between A-107 (terminal No. 4) electronic-controlled throttle valve connector and A-114 (terminal No. 16) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

STEP 10. Replace throttle body assembly

- After replacing the throttle body assembly, re-check the trouble symptoms.

Q: Is the check result normal?

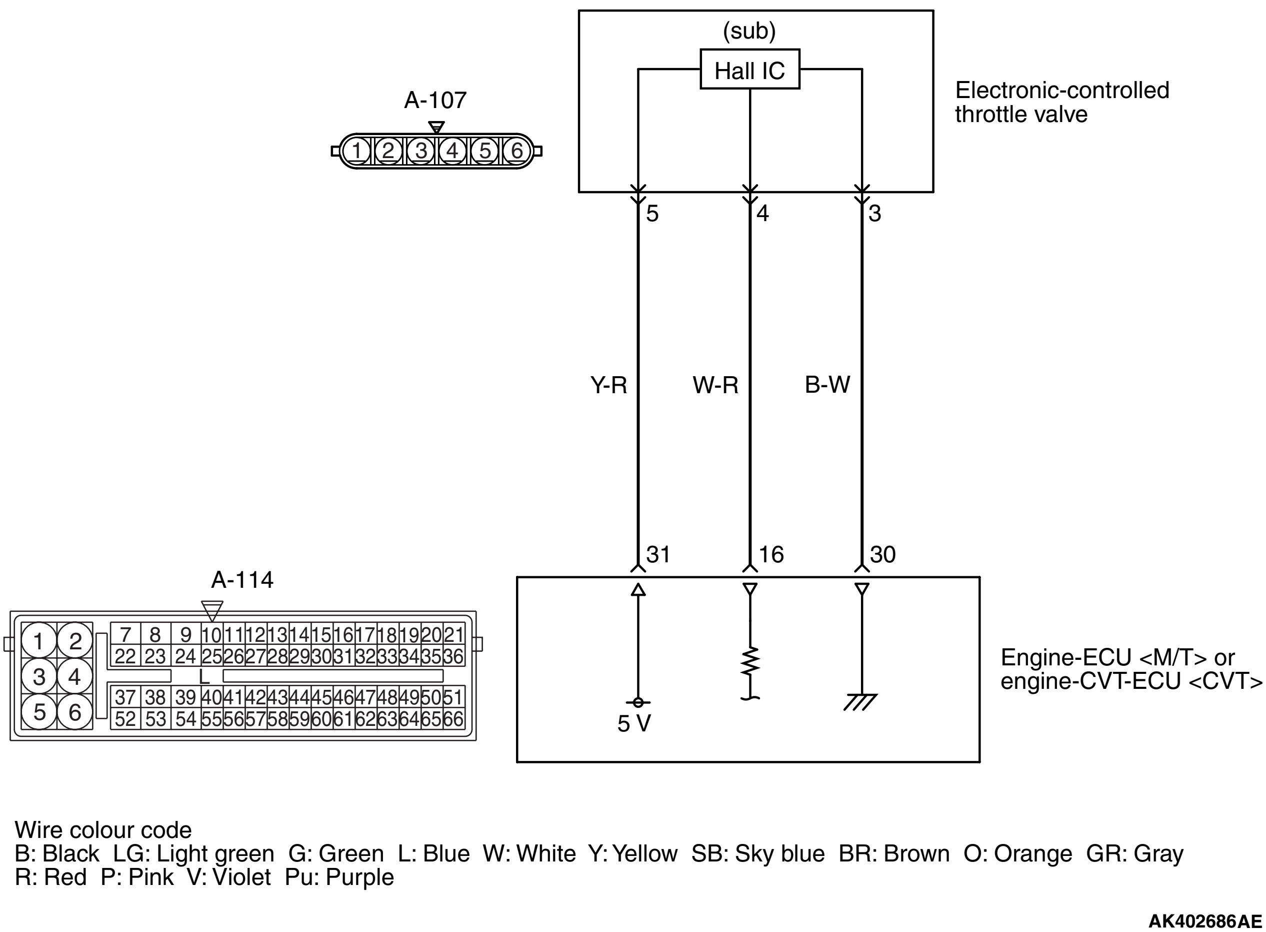
YES : Check end.

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P0223: Throttle Position Sensor (Sub) Circuit High Input

Throttle Position Sensor (sub) Circuit



OPERATION

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 31).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 30) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 16) from the electronic-controlled throttle valve output terminal (terminal No. 4).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the throttle valve position.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Throttle position sensor (sub) output voltage is 4.8 V or more <M/T>.
- Throttle position sensor (sub) output voltage is 4.8 V or more for 0.5 second <CVT>.

PROBABLE CAUSES

- Failed throttle position sensor (sub)
- Open/short circuit in throttle position sensor (sub) circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

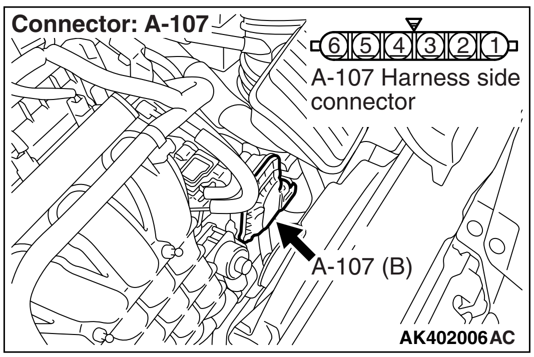
- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-107 electronic-controlled throttle valve connector

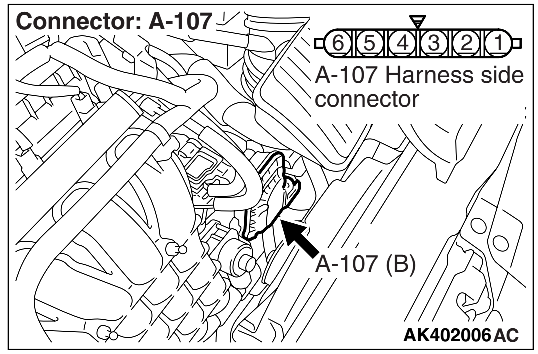


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-107 electronic-controlled throttle valve connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 3 and earth.

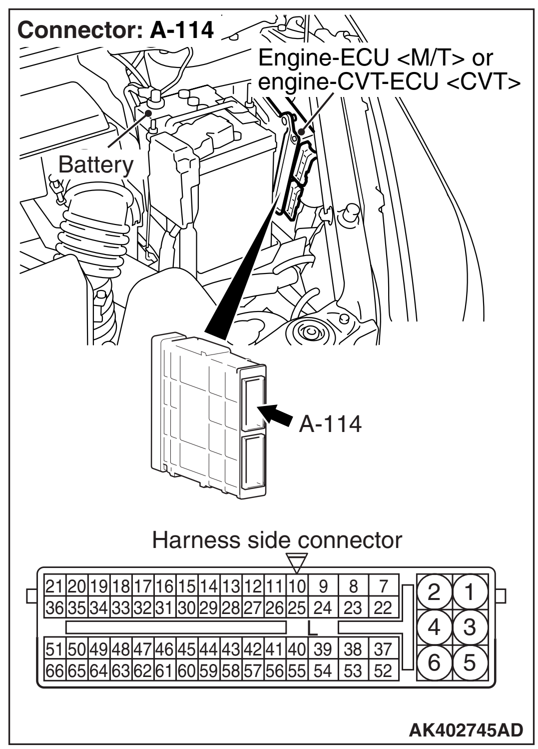
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

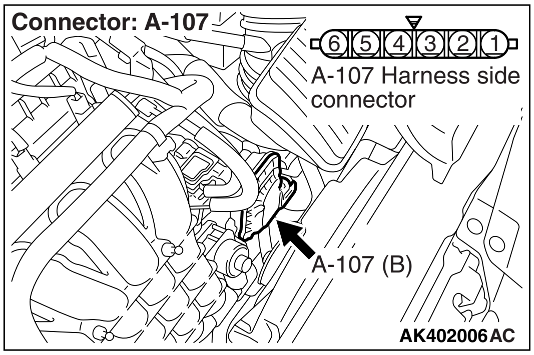


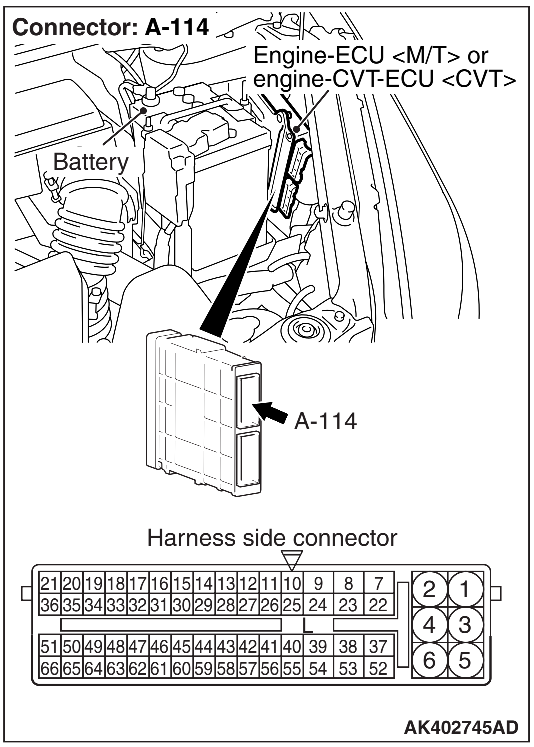
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5. Check harness between A-107 (terminal No. 3) electronic-controlled throttle valve connector and A-114 (terminal No. 30) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

- Refer the to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Replace the throttle body assembly

- After replacing the throttle body assembly, re-check the trouble symptoms.

Q: Is the check result normal?
YES : Check end.
NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P0300: Random/Multiple Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 injector system P.13A-89.
- Refer to Code No. P0202: No. 2 injector system P.13A-94.
- Refer to Code No. P0203: No. 3 injector system P.13A-99.
- Refer to Code No. P0204: No. 4 injector system P.13A-104.

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10°C or higher.
- The intake manifold pressure is above 30 kPa <M/T>.
- Barometric pressure is 76 kPa or higher <CVT>
- Volumetric efficiency is between 30 % and 55 % <CVT>.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).

or

- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSES

- Ignition system related part(s) failed
- Failed crank angle sensor
- Incorrect air-fuel ratio
- Low compression pressure
- Failed engine coolant temperature sensor
- Skipping of timing belt teeth.
- EGR system and EGR valve failed <CVT>
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

- Item 22: Crank angle sensor

OK: Keep the engine speed constant to make the pulse width of output waveform constant.

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Check crank angle sensor system (Refer to Code No. P0335 P.13A-134).

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.

a. Item 21: Engine coolant temperature sensor
b. Item 81: Long-term fuel compensation
c. Item 82: Short-term fuel compensation

Q: Are the check results normal?

YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data valve (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Visual check of ignition spark.

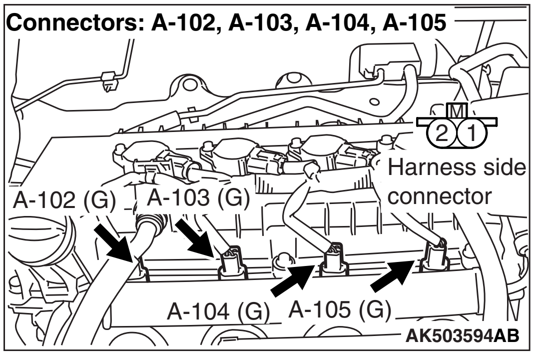
- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).

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STEP 4. Connector check: Injector connector



a. A-102 (No. 1 injector connector)
b. A-103 (No. 2 injector connector)
c. A-104 (No. 3 injector connector)
d. A-105 (No. 4 injector connector)

Q: Are the check results normal?
YES : Go to Step 5 .
NO : Repair or replace.

STEP 5. Check injector itself.

- Check Injector itself (Refer to P.13A-364).

Q: Is the check result normal?
YES : Go to Step 6 .
NO : Replace injector.

STEP 6. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355)

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Repair.

STEP 7. Check for intake of air from intake hose and inlet manifold.

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair.

STEP 8. Check for skipped timing belt teeth.

Q: Is the check result normal?
YES : Go to Step 9 <CVT> , go to Step 10 <M/T> .
NO : Repair.

STEP 9. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check P.17-20].

Q: Is the check result normal?
YES : Go to Step 10 .
NO : Replace EGR valve (stepper motor)

STEP 10. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Intermittent malfunction (Refer to Group 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0301: No. 1 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 Injector System P.13A-89.

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10°C or higher.
- The intake manifold pressure is above 30 kPa <M/T>.
- Barometric pressure is 76 kPa or higher <CVT>.
- Volumetric efficiency is between 30 % and 55 % <CVT>.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).

or

- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSES

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Visual check of ignition spark.

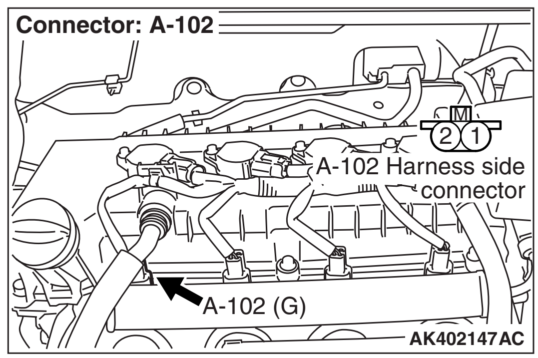
- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition circuit system (Refer to Inspection procedure 28 P.13A-320).

STEP 2. Connector check: A-102 No. 1 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 1 injector itself.

- Check Injector itself (Refer to P.13A-364).

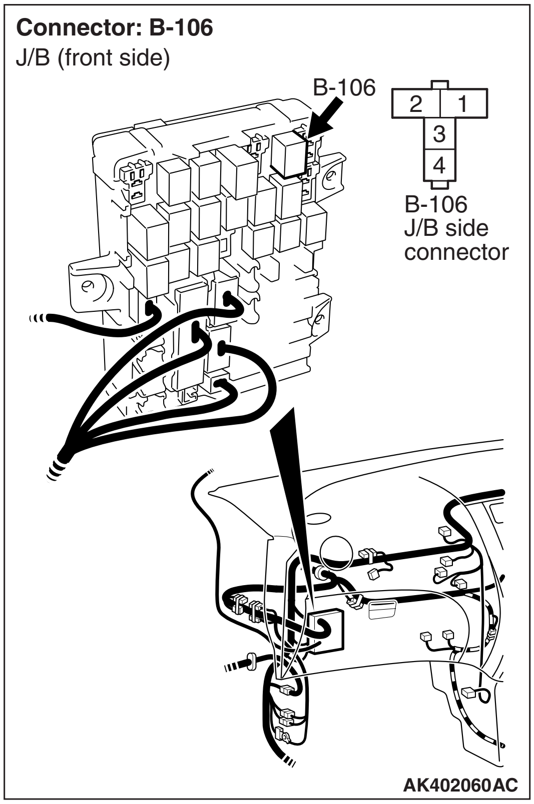
Q: Is the check result normal?

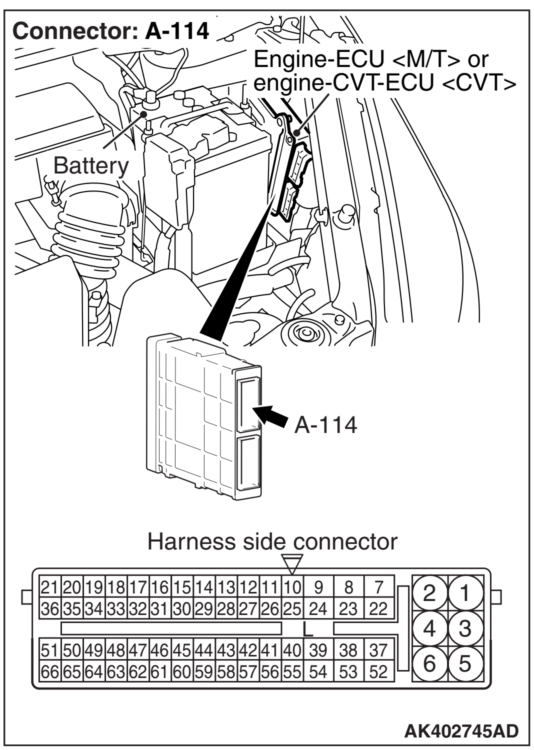
YES : Go to Step 4 .

NO : Replace the No. 1 injector.

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STEP 4. Connector check: B-106 engine control relay connector and A-114 engine-ECU connector or engine-CVT-ECU connector



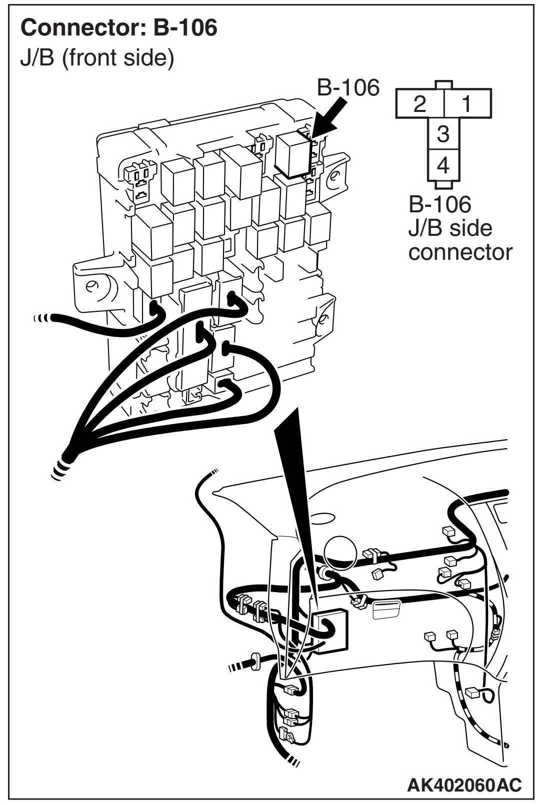


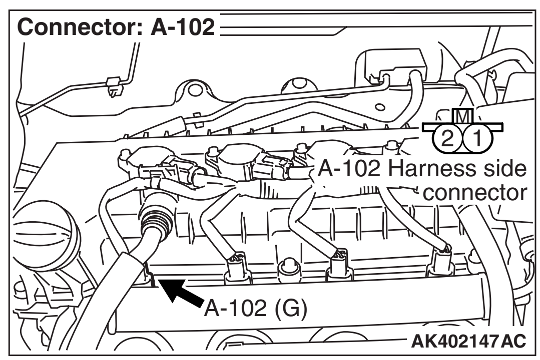
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5. Check harness between B-106 (terminal No. 4) engine control relay connector and A-102 (terminal No. 1) No. 1 injector connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

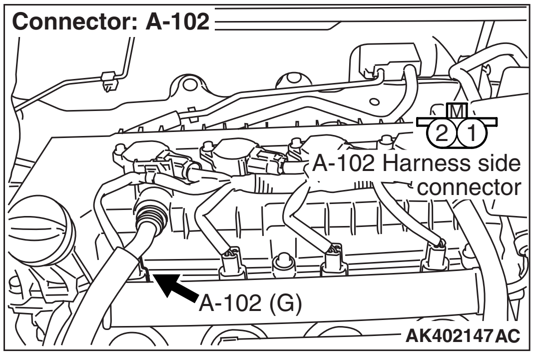
Q: Is the check result normal?

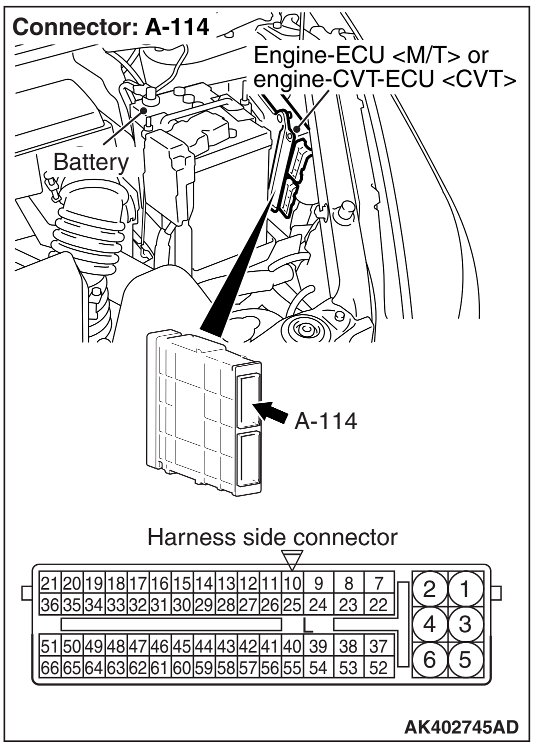
YES : Go to Step 6 .

NO : Repair the damaged harness wire.

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STEP 6. Check harness between A-102 (terminal No. 2) No. 1 injector connector and A-114 (terminal No. 8) engine-ECU connector or engine-CVT-ECU connector





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair the damaged harness wire.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the fuel pressure.

STEP 8. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0302: No. 2 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0202 No. 2 Injector System P.13A-94.

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10°C or higher.
- The intake manifold pressure is above 30 kPa <M/T>.
- Barometric pressure is 76 kPa or higher <CVT>.
- Volumetric efficiency is between 30 % and 55 % <CVT>.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).

or

- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSES

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Visual check of ignition spark.

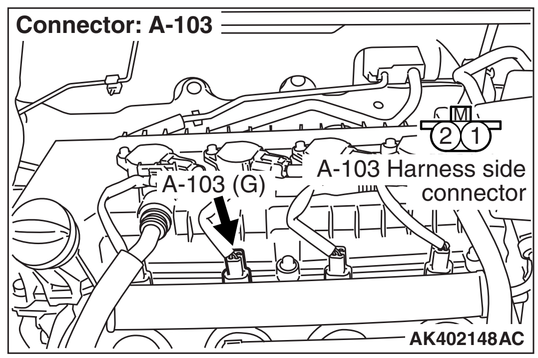
- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).

STEP 2. Connector check: A-103 No. 2 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 2 injector itself.

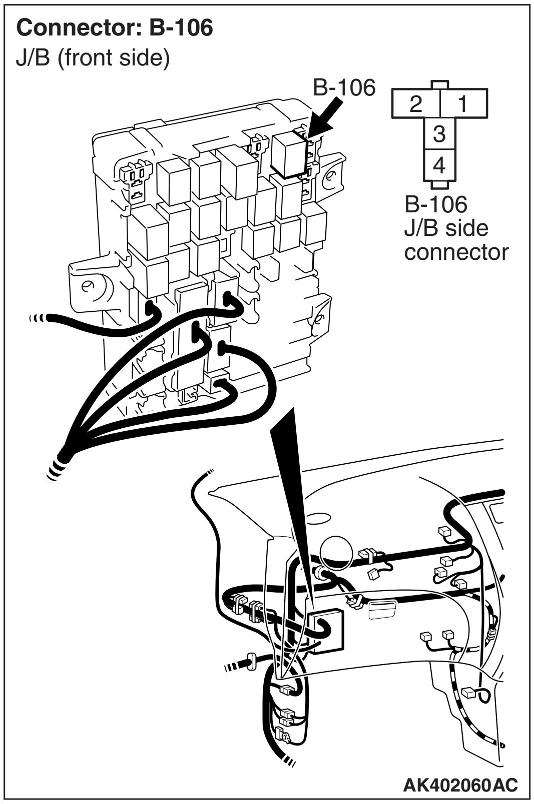
- Check Injector itself (Refer to P.13A-364).

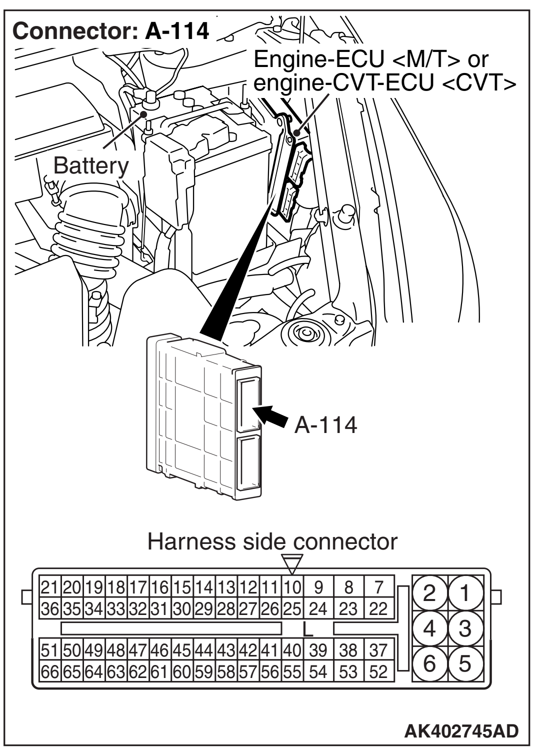
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 2 injector.

STEP 4. Connector check: B-106 engine control relay connector and A-114 engine-ECU connector or engine-CVT-ECU connector



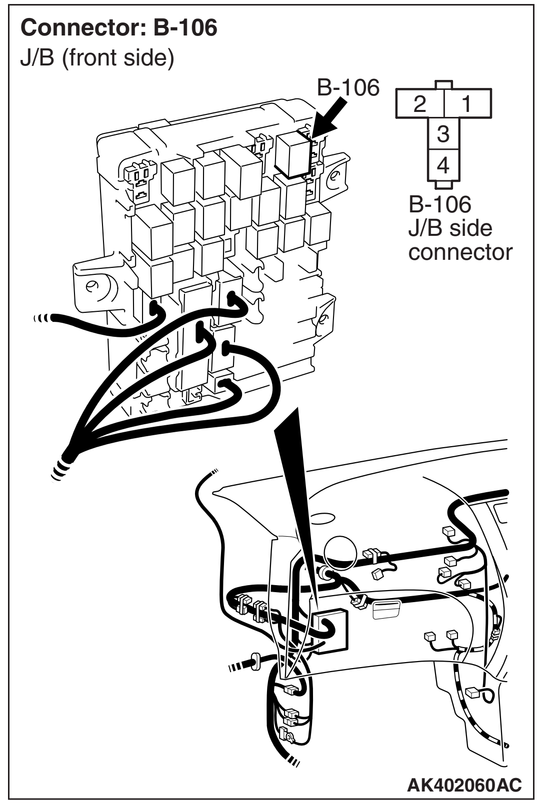


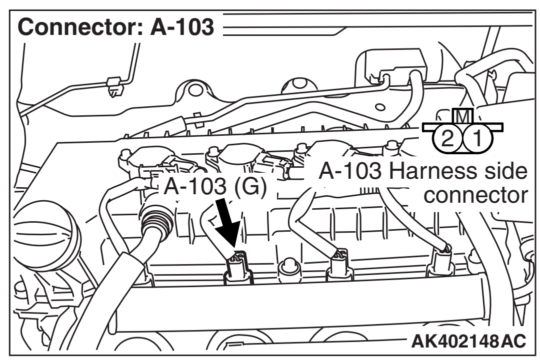
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5.Check harness between B-106 (terminal No. 4) engine control relay connector and A-103 (terminal No. 1) No. 2 injector connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

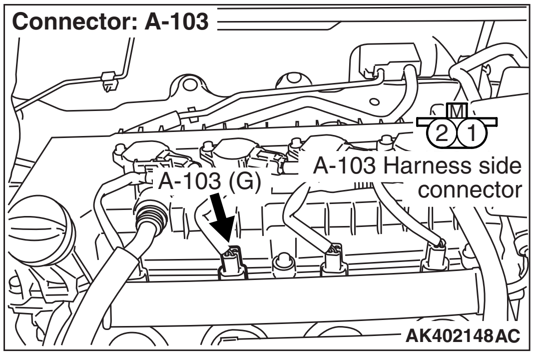
Q: Is the check result normal?

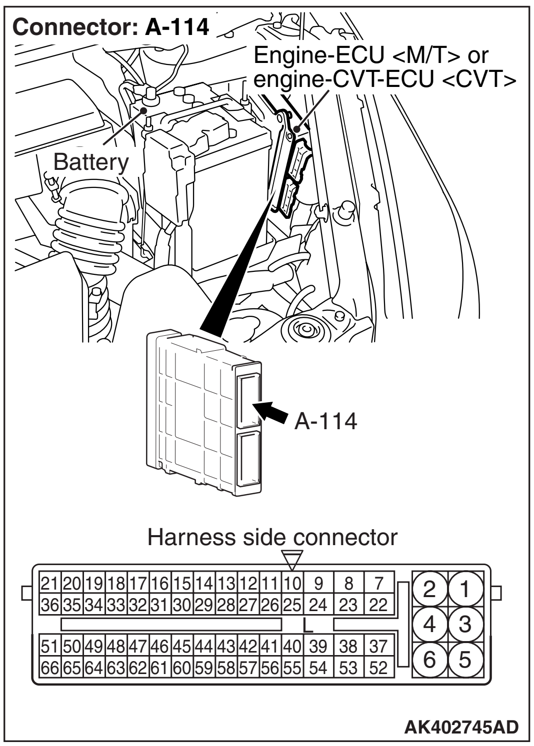
YES : Go to Step 6 .

NO : Repair the damaged harness wire.

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STEP 6. Check harness between A-103 (terminal No. 2) No. 2 injector connector and A-114 (terminal No. 9) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair the damaged harness wire.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the fuel pressure.

STEP 8. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0303: No. 3 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0203 No. 3 Injector System P.13A-99.

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10°C or higher.
- The intake manifold pressure is above 30 kPa <M/T>.
- Barometric pressure is 76 kPa or higher <CVT>.
- Volumetric efficiency is between 30 % and 55 % <CVT>.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).

or

- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSES

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Visual check of ignition spark.

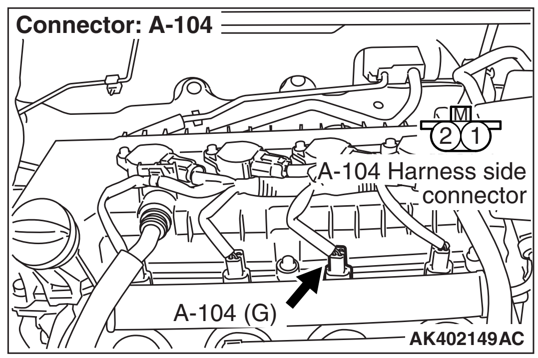
- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).

STEP 2. Connector check: A-104 No. 3 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 3 injector itself.

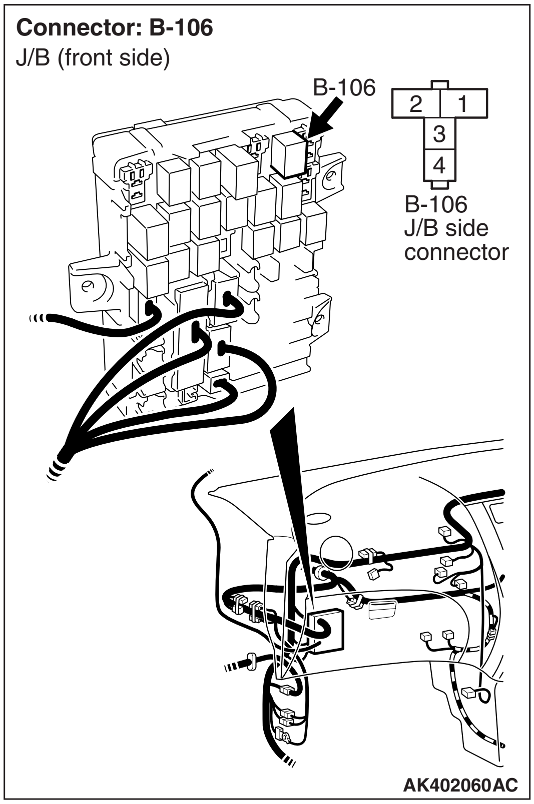
- Check Injector itself (Refer to P.13A-364).

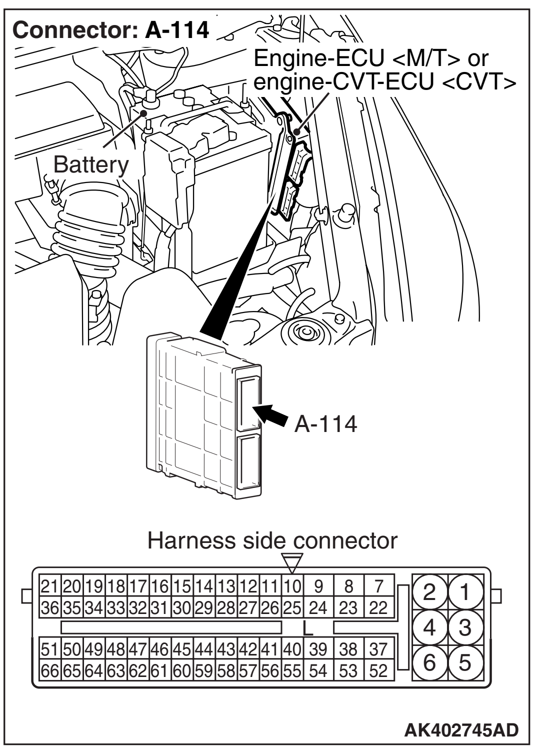
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 3 injector.

STEP 4. Connector check: B-106 engine control relay connector and A-114 engine-ECU connector or engine-CVT-ECU connector



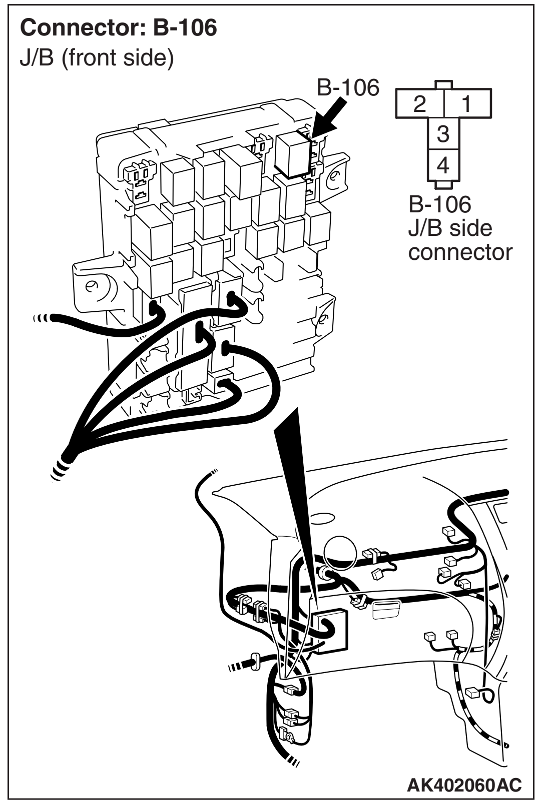


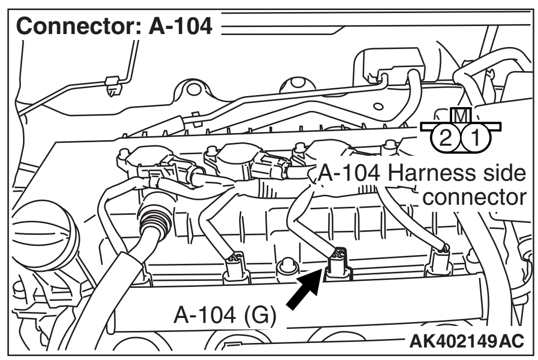
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5.Check harness between B-106 (terminal No. 4) engine control relay connector and A-104 (terminal No. 1) No. 3 injector connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

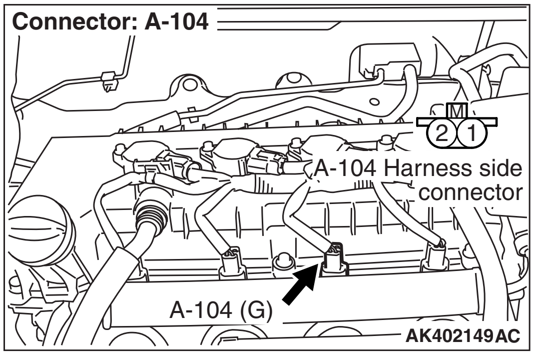
Q: Is the check result normal?

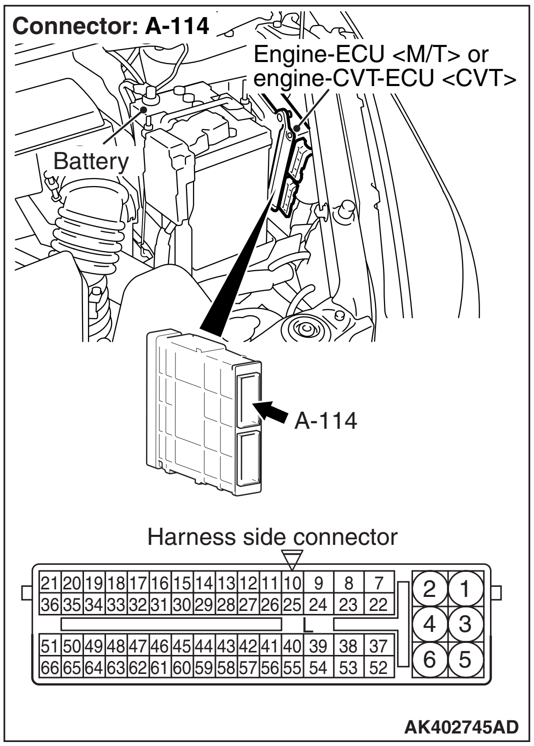
YES : Go to Step 6 .

NO : Repair the damaged harness wire.

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STEP 6. Check harness between A-104 (terminal No. 2) No. 3 injector connector and A-114 (terminal No. 23) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .
NO : Repair the damaged harness wire.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Go to Step 8 .
NO : Repair the fuel pressure.

STEP 8. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0304: No. 4 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0204 No. 4 Injector System P.13A-104.

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10°C or higher.
- The intake manifold pressure is above 30 kPa <M/T>.
- Barometric pressure is 76 kPa or higher <CVT>.
- Volumetric efficiency is between 30 % and 55 % <CVT>.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).

or

- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSES

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Visual check of ignition spark.

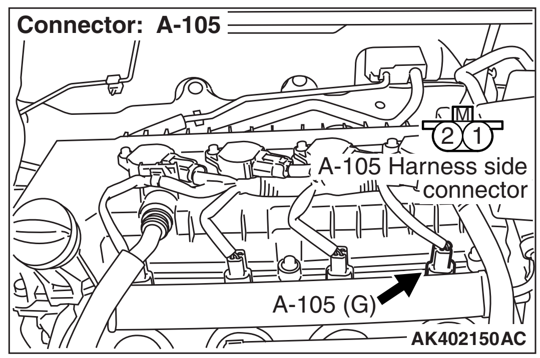
- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition Circuit System (Refer to Inspection Procedure 28 P.13A-320).

STEP 2. Connector check: A-105 No. 4 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair the damaged harness wire.

STEP 3. Check No. 4 injector itself.

- Check Injector itself (Refer to P.13A-364).

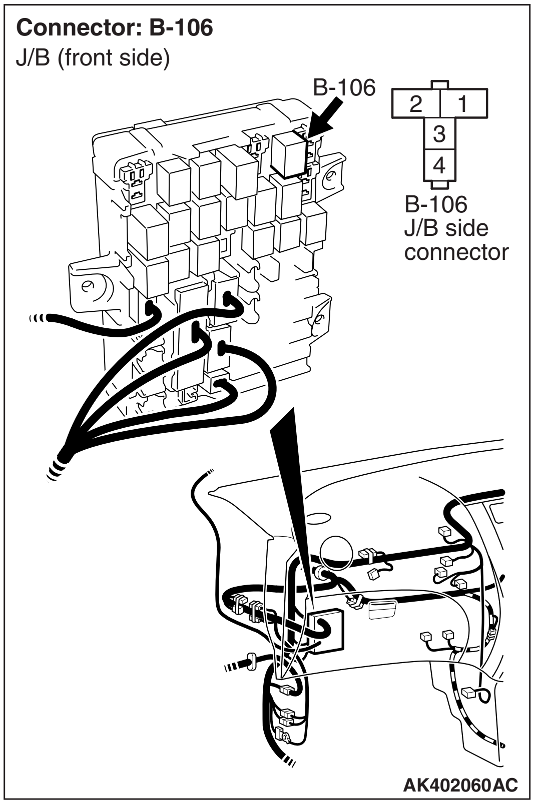
Q: Is the check result normal?

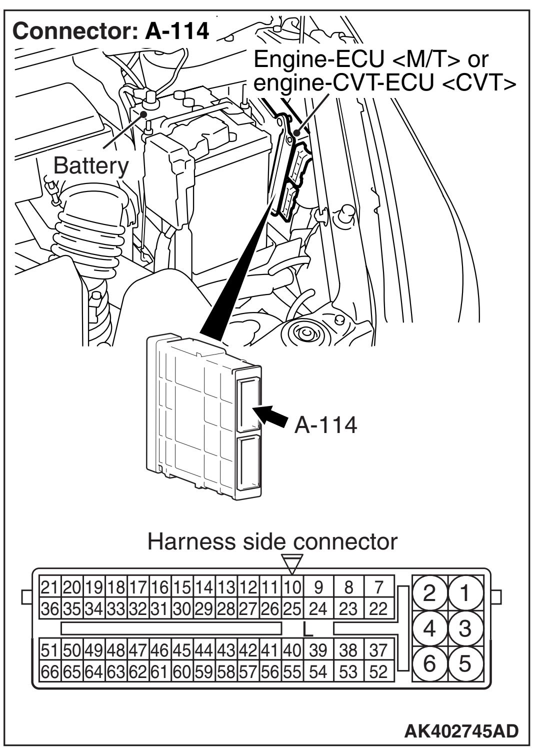
YES : Go to Step 4 .

NO : Replace the No. 4 injector.

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STEP 4. Connector check: B-106 engine control relay connector and A-114 engine-ECU connector or engine-CVT-ECU connector



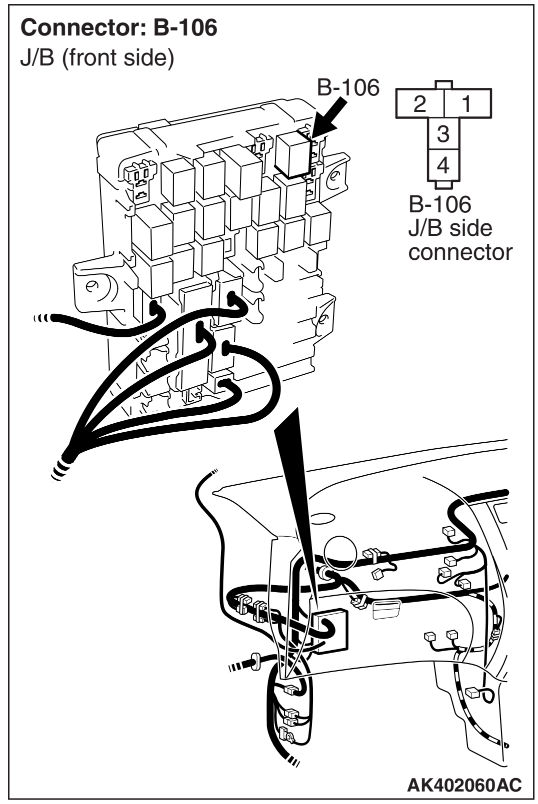


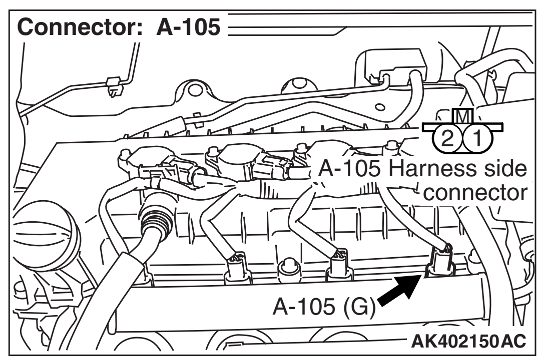
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5. Check harness between B-106 (terminal No. 4) engine control relay connector and A-105 (terminal No. 1) No. 4 injector connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

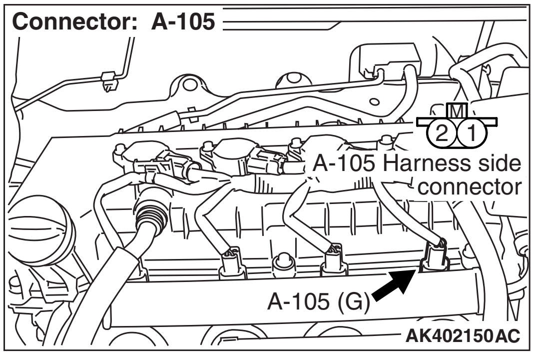
Q: Is the check result normal?

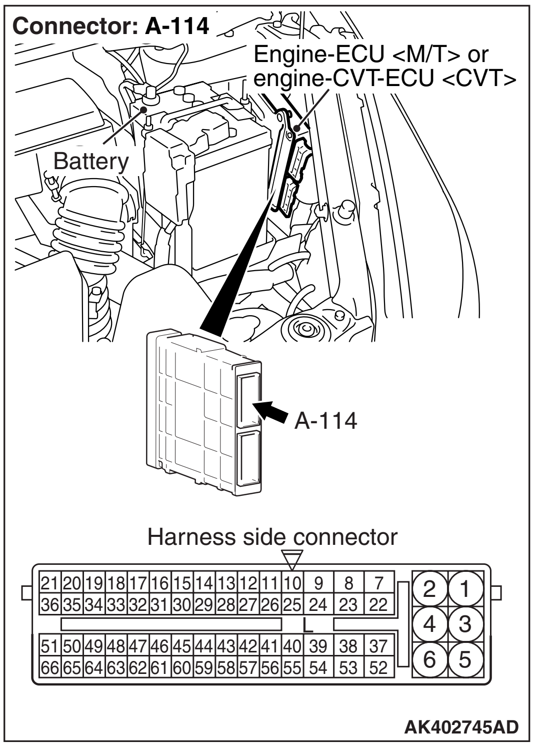
YES : Go to Step 6 .

NO : Repair the damaged harness wire.

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STEP 6. Check harness between A-105 (terminal No. 2) No. 4 injector connector and A-114 (terminal No. 24) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair the damaged harness wire.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the fuel pressure.

STEP 8. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

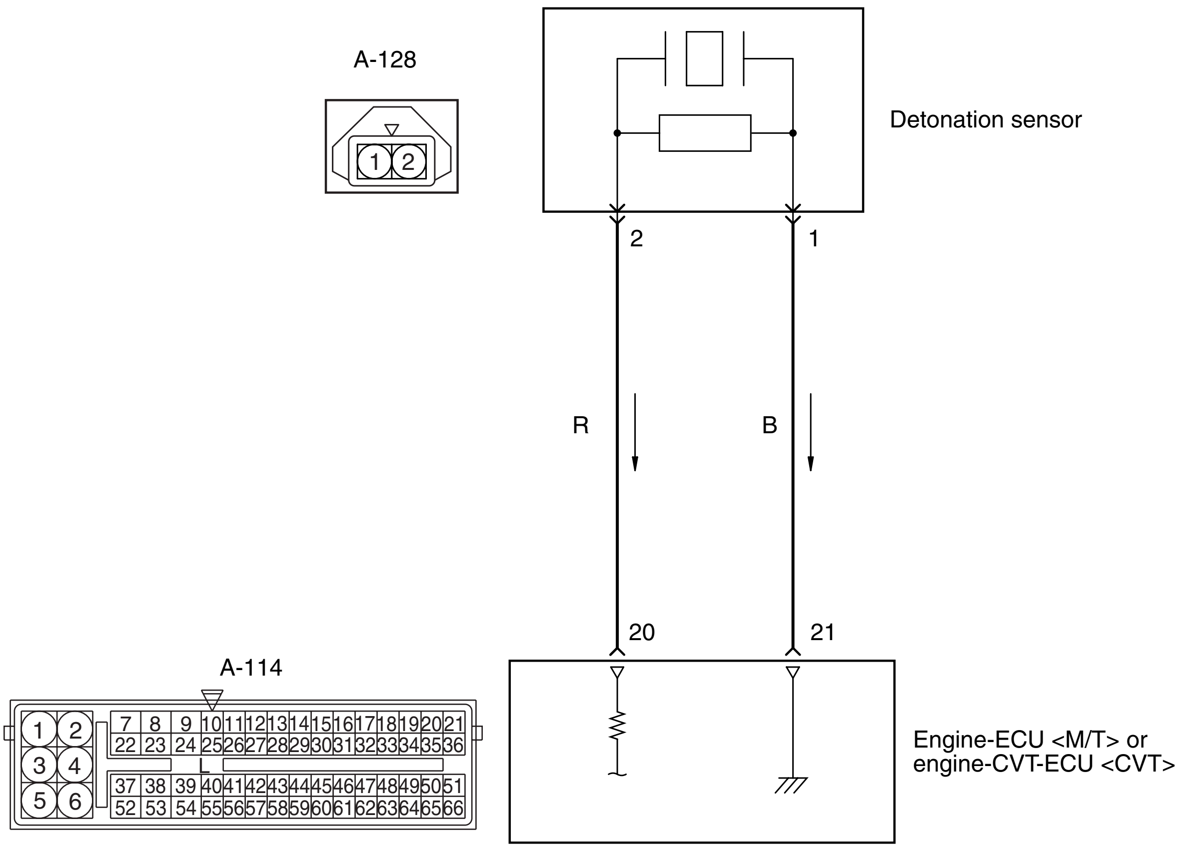
Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0325: Detonation Sensor System

Detonation Sensor Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402688 AC

OPERATION

- A power voltage of 5 V is applied to the detonation output terminal (terminal No. 2) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 20).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 21) from the detonation sensor (terminal No. 1).

FUNCTION

- The detonation sensor detects the vibration of the cylinder block caused by detonation waves, and inputs a signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> provides controls to retard the ignition timing when the detonation occurs.

TROUBLE JUDGMENT

Check Conditions

- After 2 seconds have passed since the engine starting sequence was completed.
- The engine speed is above 2,500 r/min <M/T>.
- The intake manifold pressure is above specified value <M/T>.

Judgment Criterion

- When change in detonation sensor output voltage is feeble for 200 consecutive times.

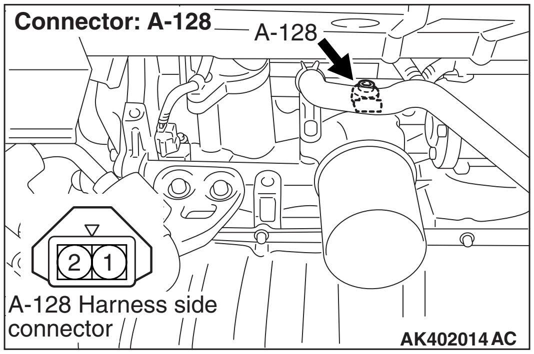
PROBABLE CAUSES

- Failed detonation sensor
- Open/short circuit in detonation sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

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DIAGNOSIS PROCEDURE

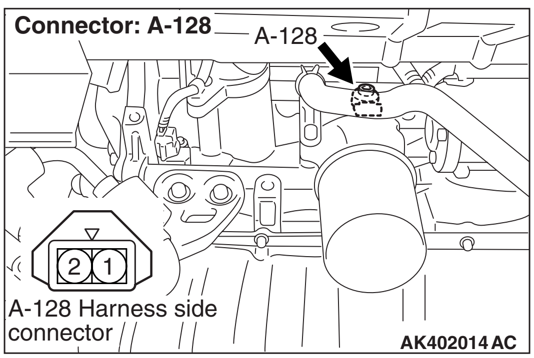
STEP 1. Connector check: A-128 detonation sensor connector



Q: Is the check result normal?

YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at A-128 detonation sensor connector.



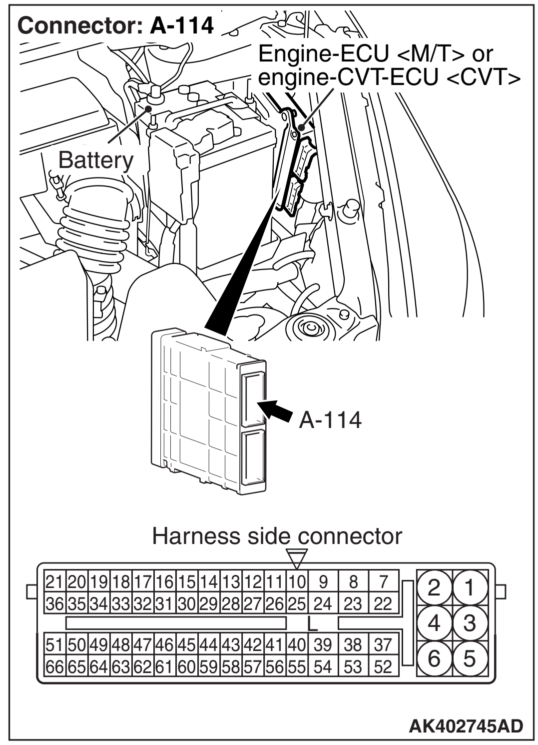
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

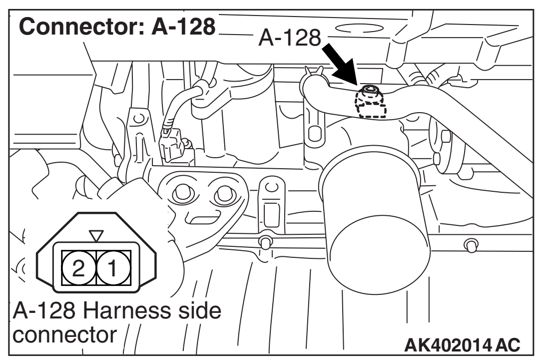
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Go to Step 3 .

STEP 3. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



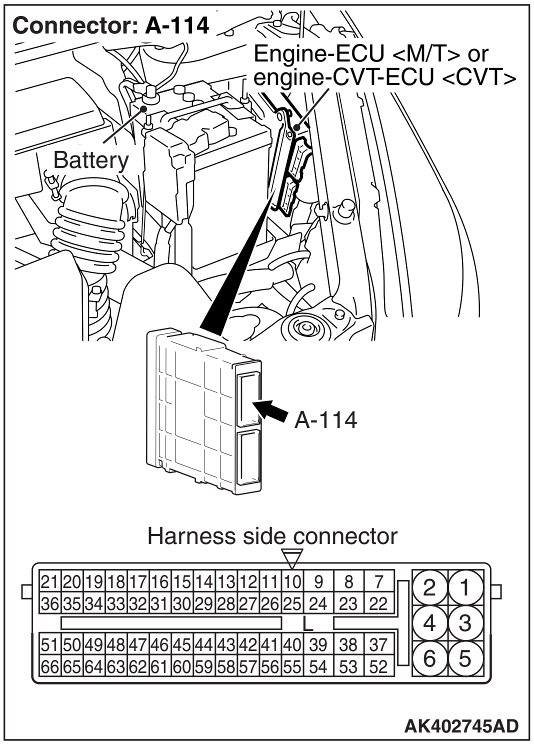


Q: Is the check result normal?

YES : Check and repair harness between A-128 (terminal No. 1) detonation sensor connector and A-114 (terminal No. 21) engine-ECU connector or engine-CVT-ECU connector.
NO : Repair or replace the connector.

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STEP 4. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

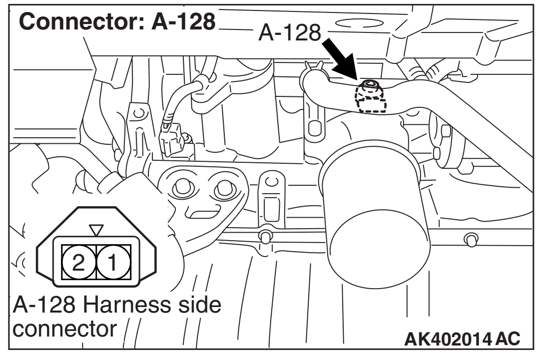


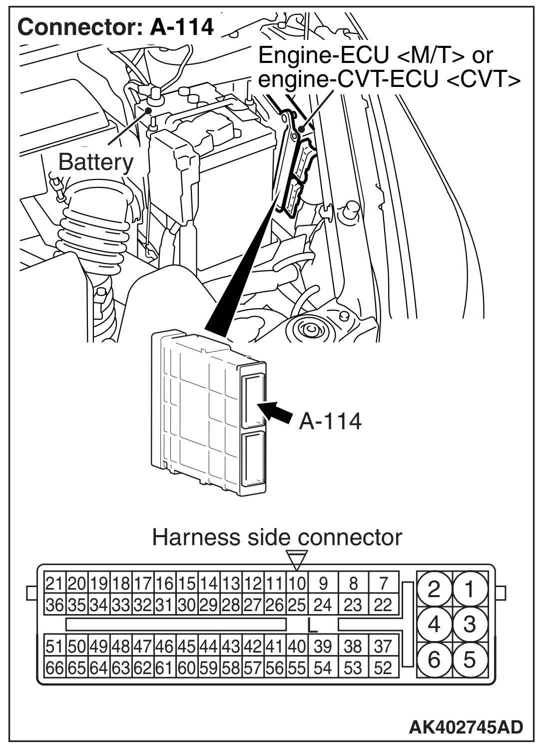
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5. Check harness between A-128 (terminal No. 2) detonation sensor connector and A-114 (terminal No. 20) engine-ECU connector or engine-CVT-ECU connector





- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Go to Step 7 .

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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STEP 7. Reconfirm the diagnosis code after replacing the detonation sensor.

- Reconfirm the diagnosis code after replacing the detonation sensor.

Q: Is the diagnosis code set?

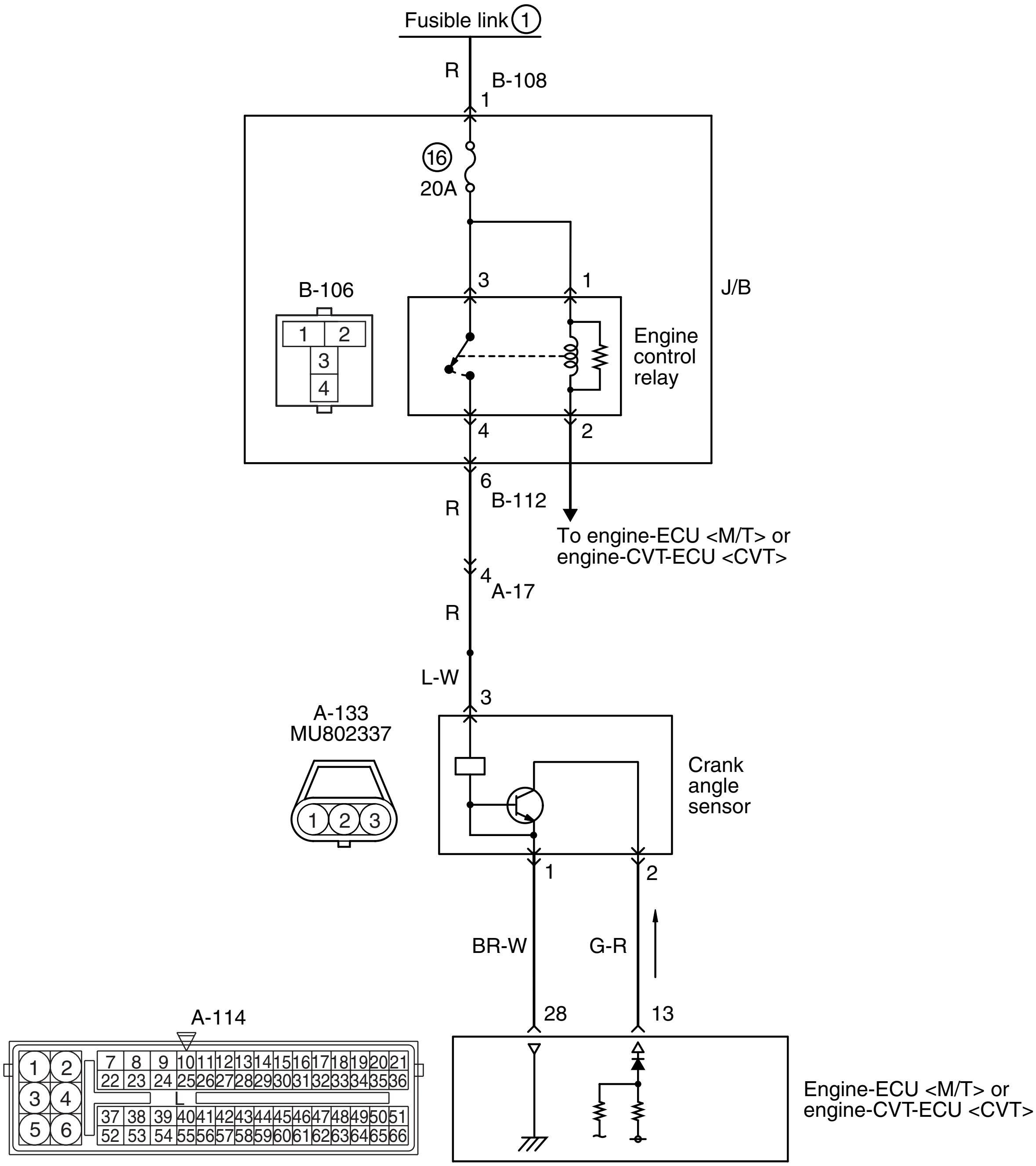
YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Check end.

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Code No. P0335: Crank Angle Sensor System

Crank Angle Sensor Circuit



OPERATION

- Power is supplied to the crank angle sensor (terminal No. 3) from the engine control relay (terminal No. 4) and is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 28) from the crank angle sensor (terminal No. 1).
- A power voltage of 5 V is applied to the crank angle sensor output terminal (terminal No. 2) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 13).

FUNCTION

- The crank angle sensor detects the crank angle (position) and inputs a pulse signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> controls the injector, etc.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position <M/T>.

Judgment Criteria

- Pulse signal from crank angle sensor continues 264 times and engine speed is less than 440 r/min <M/T>.
- Crank angle sensor signal pattern is abnormal <M/T>.

Check Condition

- Ignition switch is in "ON" position <M/T>.

Judgment Criterion

- Crank angle sensor signal pattern is not normal for 4 seconds and engine speed is more than 440 r/min <M/T>.

Check Condition

- While engine is cranking.

Judgment Criterion

- Crank angle sensor output voltage has not been changed (no pulse signal has been input) for 4 seconds.

PROBABLE CAUSES

- Failed crank angle sensor
- Open/short circuit in crank angle sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

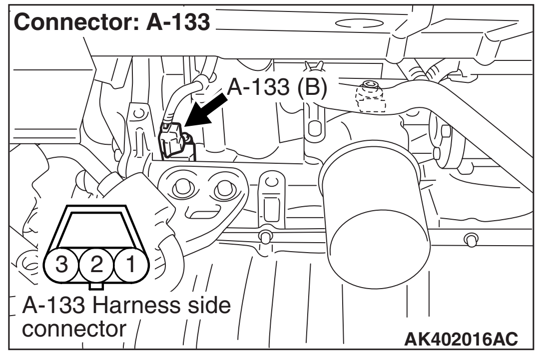
- Refer to Data List Reference Table P.13A-331.
  a. Item 22: Crank angle sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-133 crank angle sensor connector

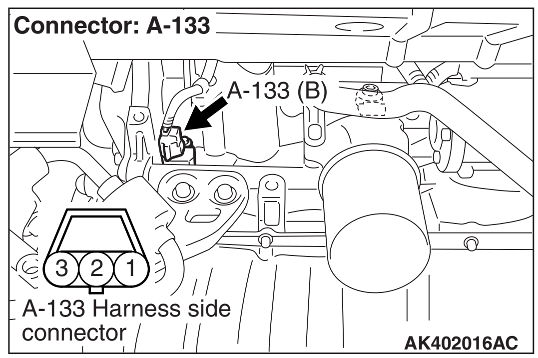


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at A-133 crank angle sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

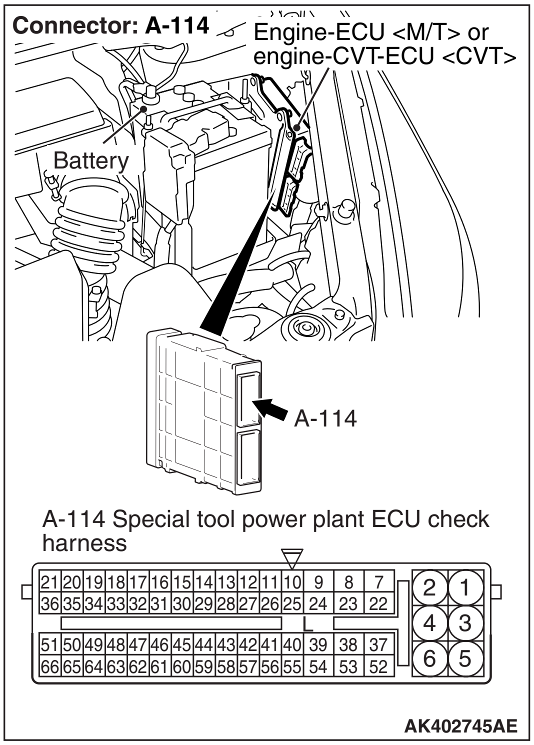
OK: 4.9 – 5.1 V

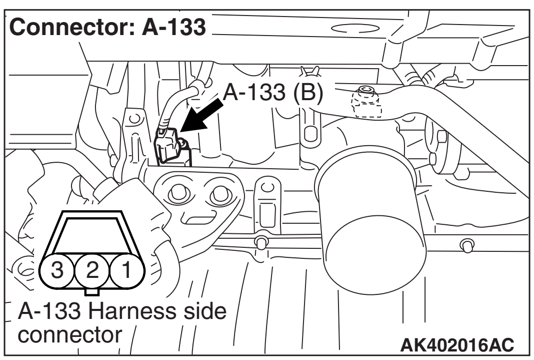
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 4 .

STEP 4. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.





- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Disconnect A-133 crank angle sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 13 and earth.

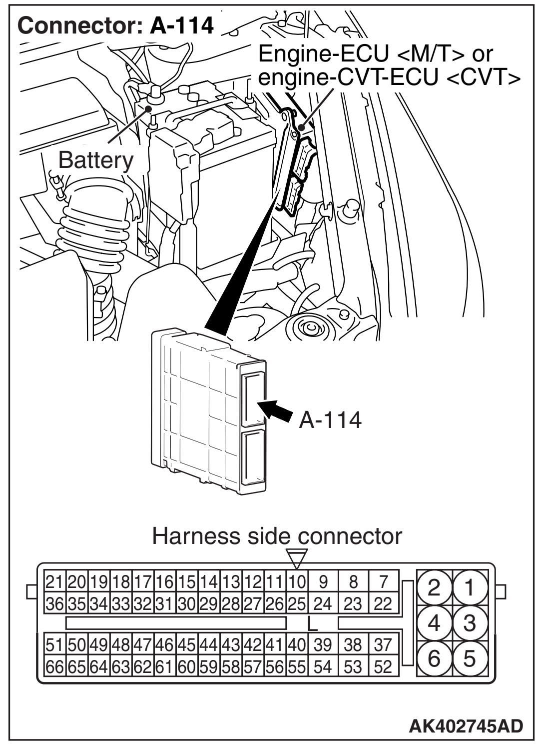
OK: 4.9 – 5.1 V

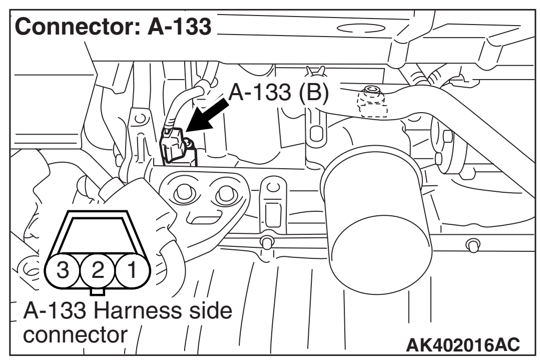
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





Q: Is the check result normal?

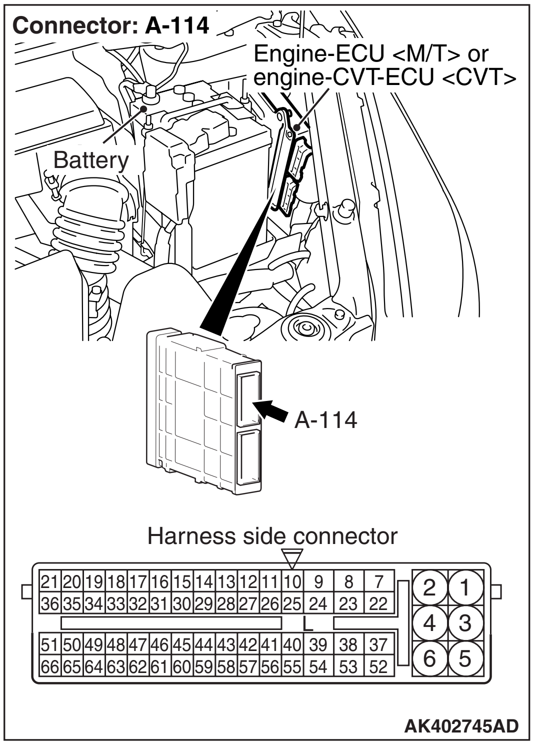
YES : Check and repair harness between A-133 (terminal No. 2) crank angle sensor connector and A-114 (terminal No. 13) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for open circuit.

NO : Repair or replace the connector.

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STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

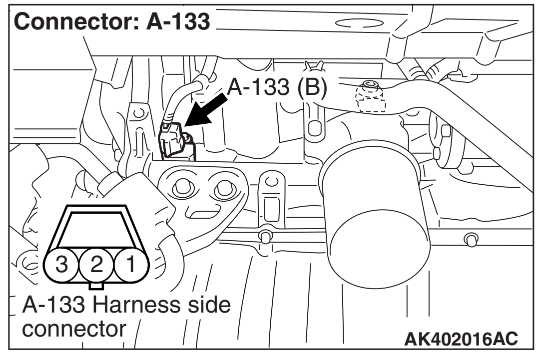


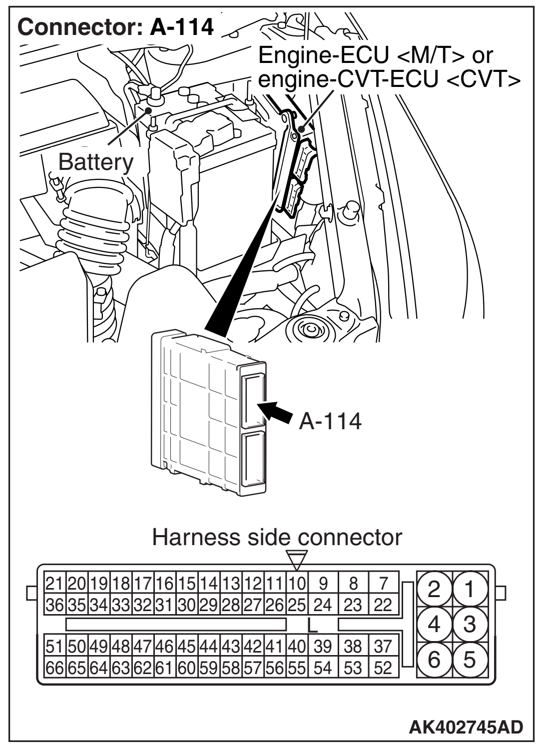
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between A-133 (terminal No. 2) crank angle sensor connector and A-114 (terminal No. 13) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 22: Crank angle sensor

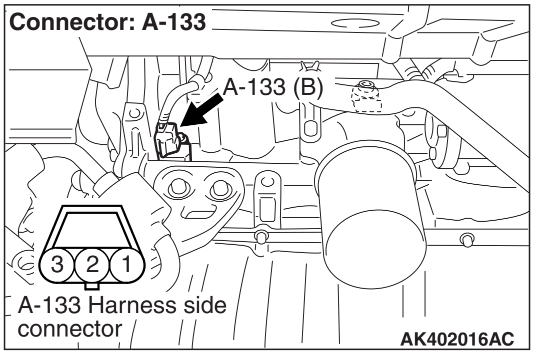
Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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STEP 9. Perform voltage measurement at A-133 crank angle sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

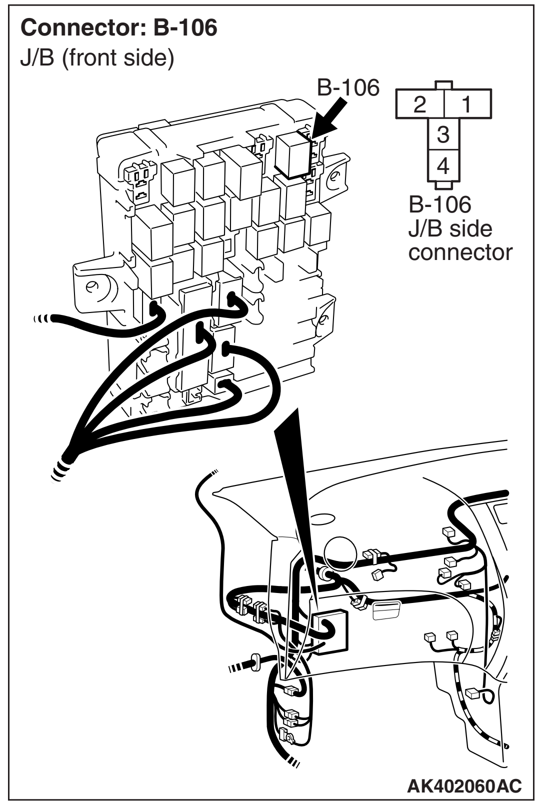
  OK: System voltage

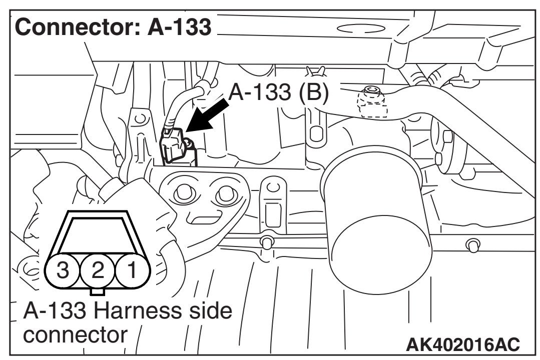
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 10 .

STEP 10. Connector check: B-106 engine control relay connector





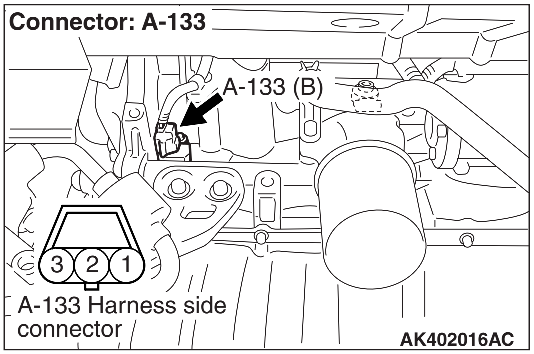
Q: Is the check result normal?

YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-133 (terminal No. 3) crank angle sensor connector and B-106 (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 11. Perform resistance measurement at A-133 crank angle sensor connector.



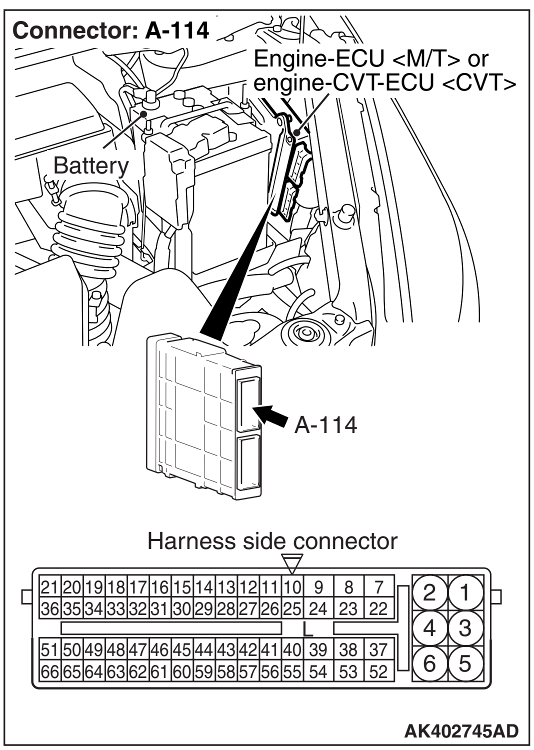
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 15 .
NO : Go to Step 12 .

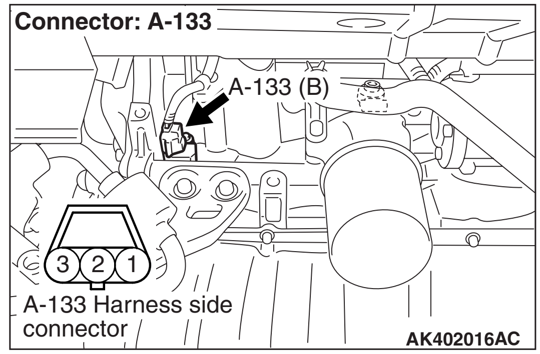
STEP 12. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

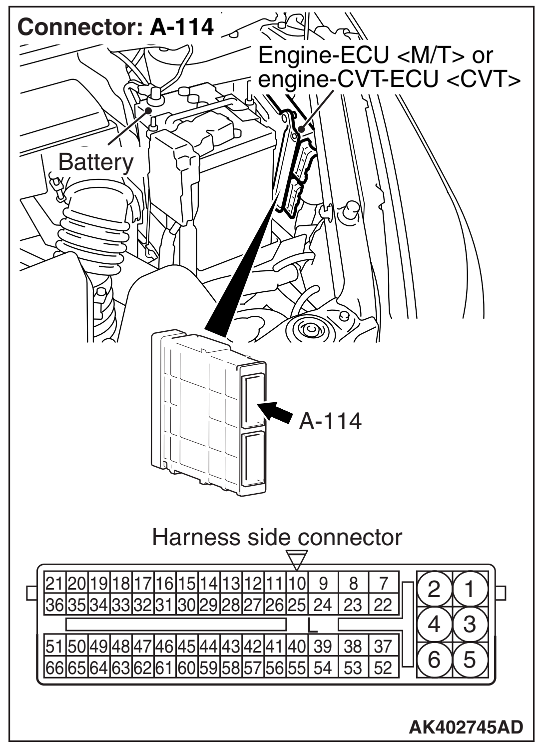


Q: Is the check result normal?

YES : Go to Step 13 .
NO : Repair or replace the connector.

STEP 13. Check harness between A-133 (terminal No. 1) crank angle sensor connector and A-114 (terminal No. 28) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 14 .
NO : Repair the damaged harness wire.

STEP 14. M.U.T.-III data list

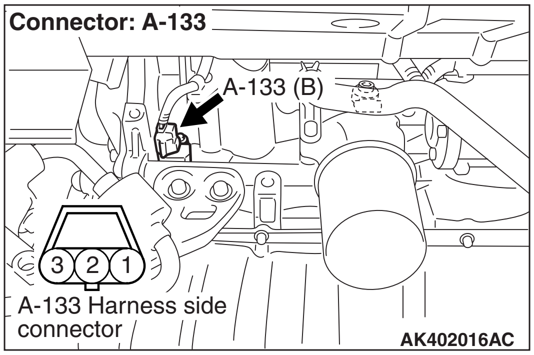
- Refer to Data List Reference Table P.13A-331.
  a. Item 22: Crank angle sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace crank angle sensor.

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STEP 15. Perform output wave pattern measurement at A-133 crank angle sensor connector (Using an oscilloscope).

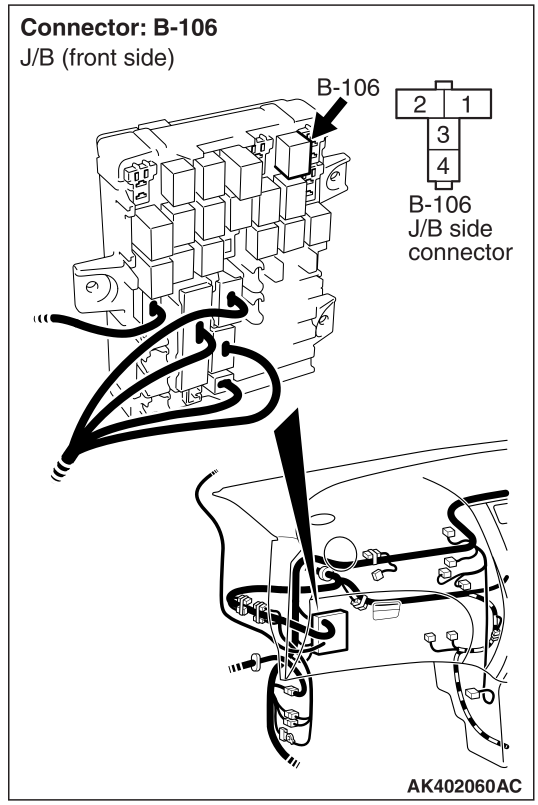


- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 2 and earth.

OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-348), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

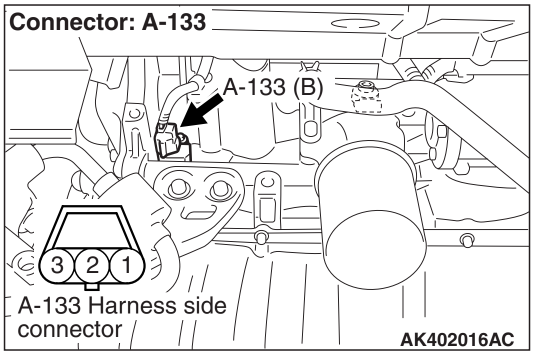
Q: Is the check result normal?
YES : Go to Step 21 .
NO : Go to Step 16 .

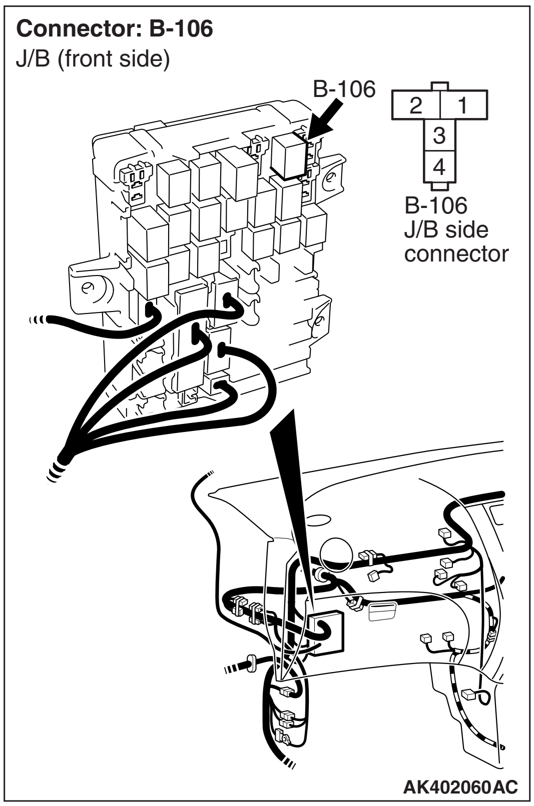
STEP 16. Connector check: B-106 engine control relay connector



Q: Is the check result normal?
YES : Go to Step 17 .
NO : Repair or replace the connector.

STEP 17. Check harness between A-133 (terminal No. 3) crank angle sensor connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

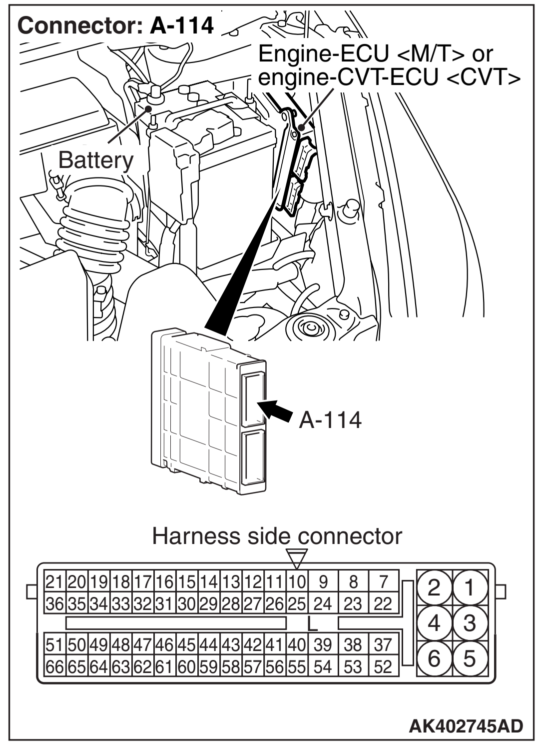
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair the damaged harness wire.

STEP 18. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



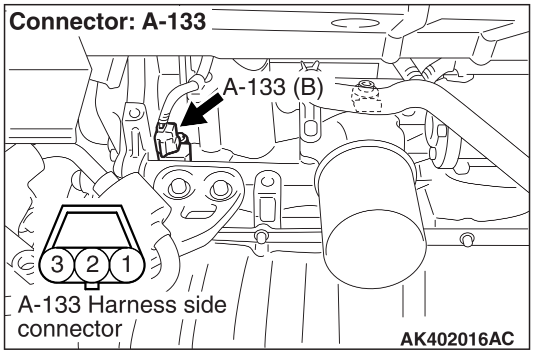
Q: Is the check result normal?

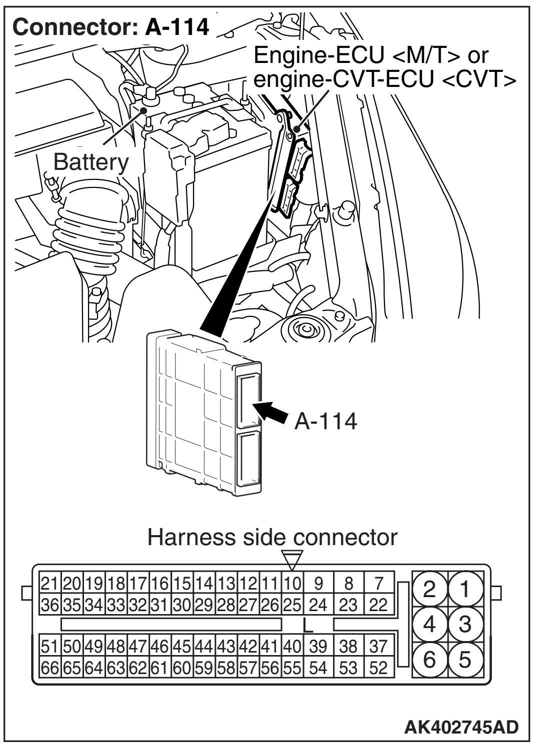
YES : Go to Step 19 .

NO : Repair or replace the connector.

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STEP 19. Check harness between A-133 (terminal No. 2) crank angle sensor connector and A-114 (terminal No. 13) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 20 .
NO : Repair the damaged harness wire.

STEP 20. Check the crankshaft sensing ring.

Q: Is the check result normal?
YES : Replace crank angle sensor.
NO : Replace the crankshaft sensing ring.

STEP 21. M.U.T.-III data list

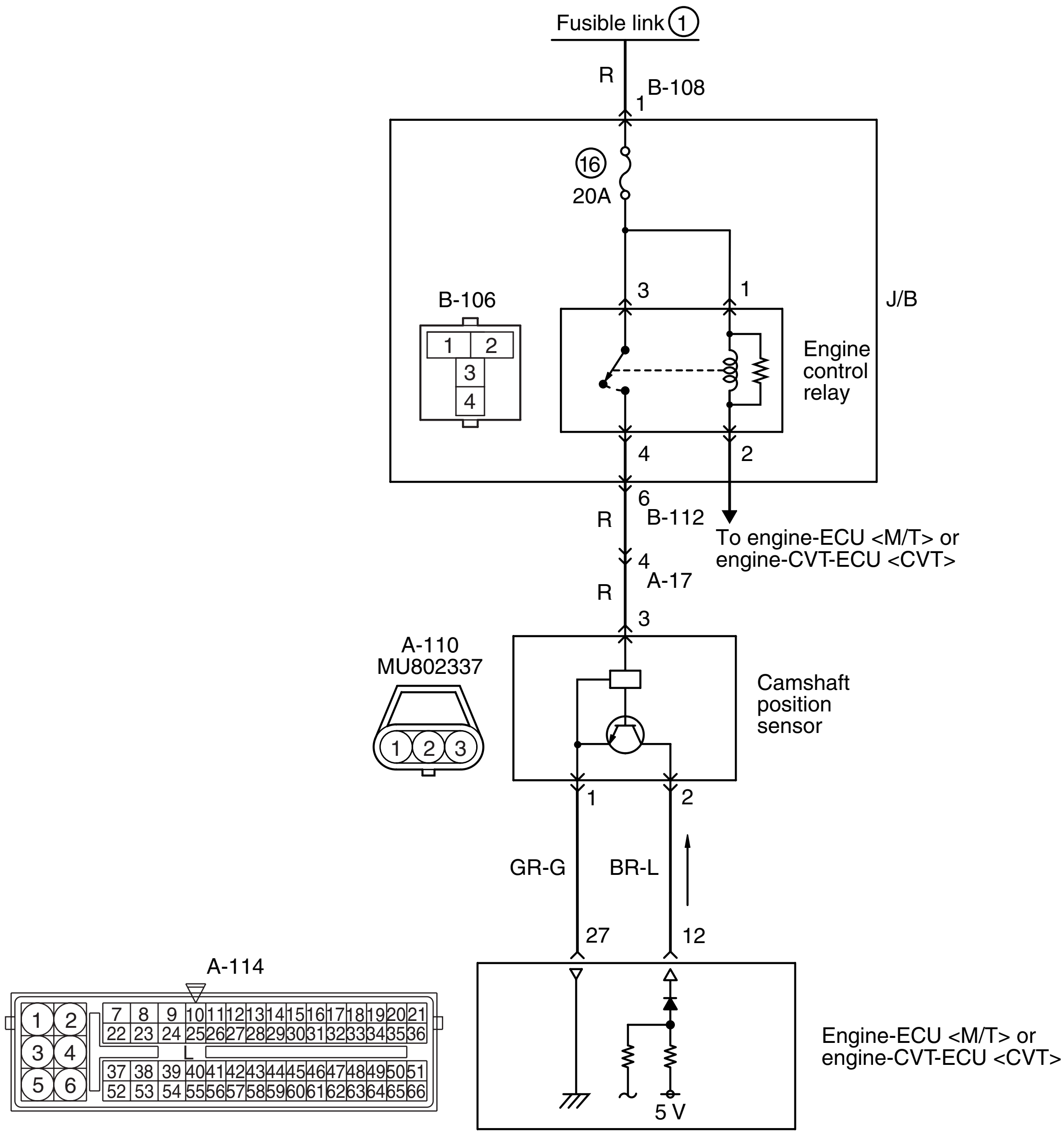
- Refer to Data List Reference Table P.13A-331.
  a. Item 22: Crank angle sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P0340: Camshaft Position Sensor System

Camshaft Position Sensor Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402690AE

OPERATION

- Power is supplied to the camshaft position sensor (terminal No. 3) from the engine control relay (terminal No. 4) and is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 27) from the camshaft position sensor (terminal No. 1).
- A power voltage of 5 V is applied to the camshaft position sensor output terminal (terminal No. 2) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 12).

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FUNCTION

- The camshaft position sensor detects the top dead center on the compression stroke of the No. 1 cylinder and inputs a pulse signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position <M/T>.

Judgment Criteria

- Pulse signal from crank angle sensor continues 264 times and engine speed is less than 440 r/min <M/T>.
- Camshaft position sensor signal pattern is abnormal <M/T>.

Check Condition

- Ignition switch is in "ON" position <M/T>.

Judgment Criterion

- Camshaft position sensor signal pattern is not normal for 4 seconds and engine speed is more than 440 r/min <M/T>.

Check Condition

- While engine is being cranked or operated <CVT>.

Judgment Criterion

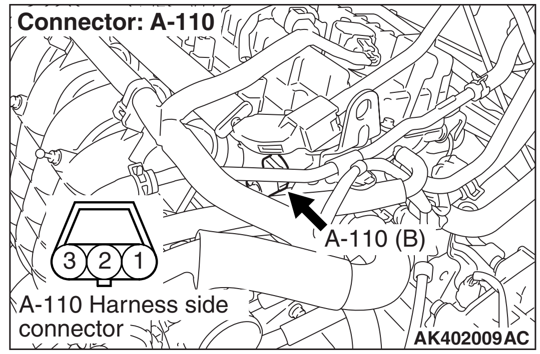
- Camshaft position sensor output voltage has not been changed (no pulse signal is has been input) for 4 seconds <CVT>.

PROBABLE CAUSES

- Failed camshaft position sensor
- Open/short circuit in camshaft position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-110 camshaft position sensor connector

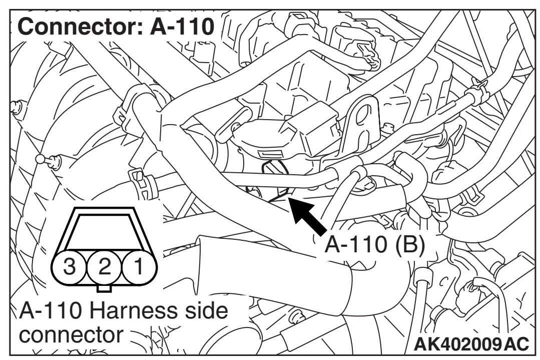


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at A-110 camshaft position sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

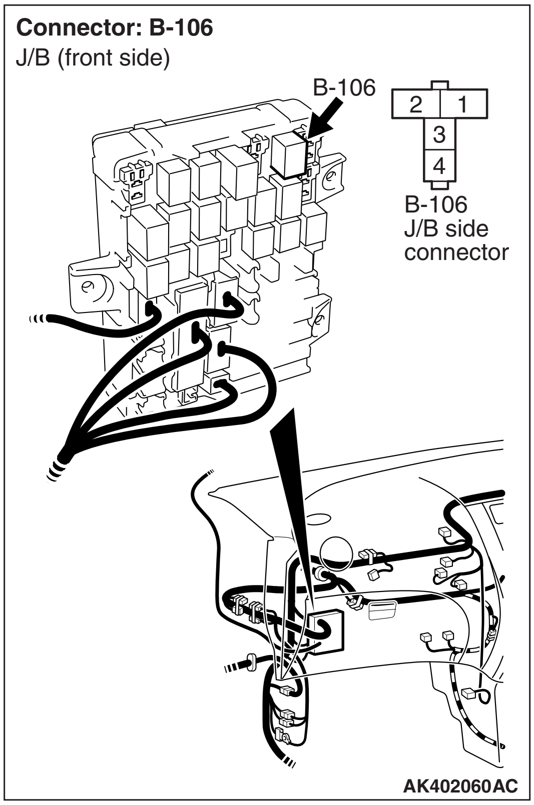
Q: Is the check result normal?

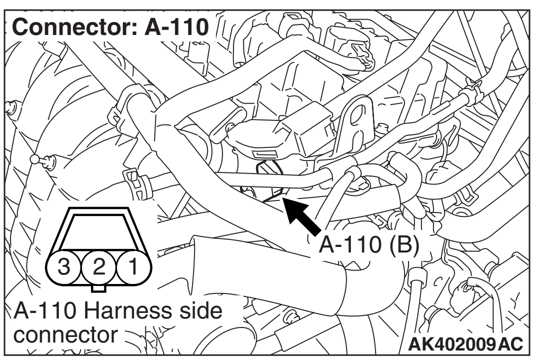
YES : Go to Step 4 .

NO : Go to Step 3 .

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STEP 3. Connector check: B-106 engine control relay connector





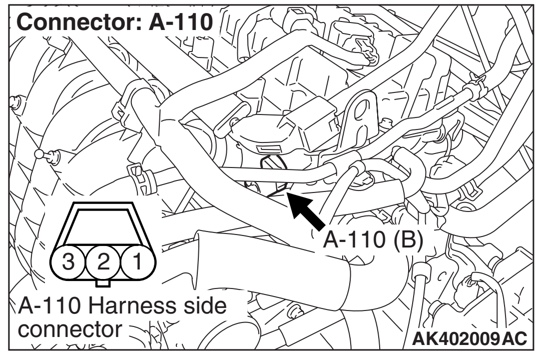
Q: Is the check result normal?

YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-110 (terminal No. 3) camshaft position sensor connector and B-106 (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 4. Perform voltage measurement at A-110 camshaft position sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: 4.9 – 5.1 V

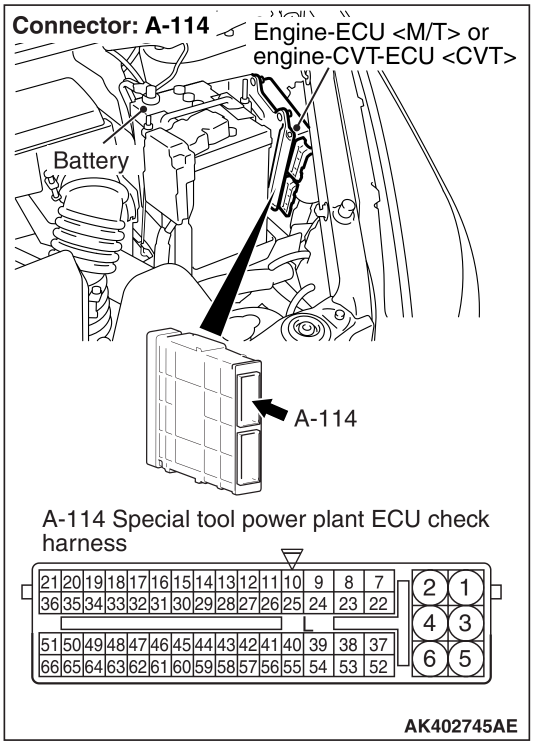
Q: Is the check result normal?

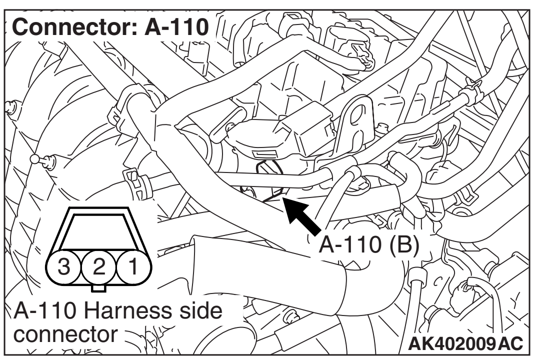
YES : Go to Step 10 .

NO : Go to Step 5 .

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STEP 5. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.





- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Disconnect A-110 camshaft position sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 12 and earth.

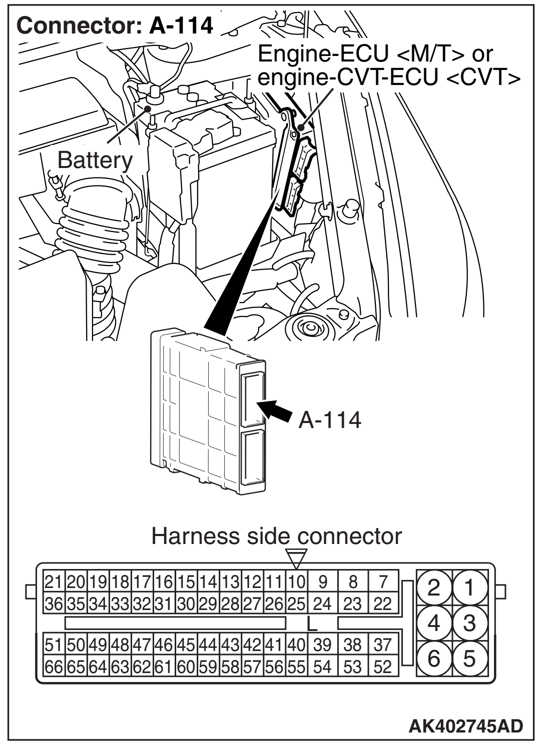
OK: 4.9 – 5.1 V

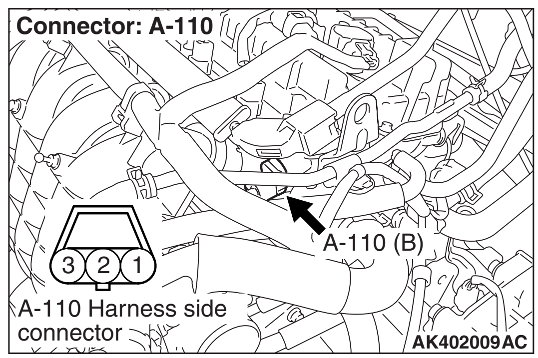
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 7 .

STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





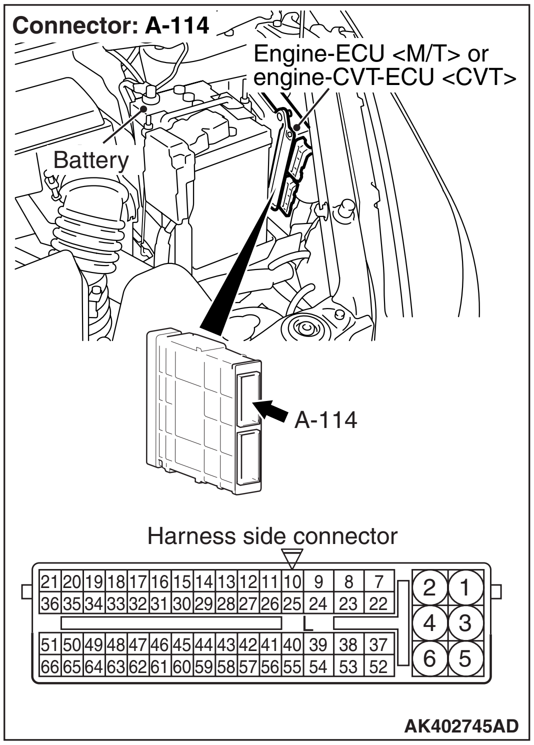
Q: Is the check result normal?

YES : Check and repair harness between A-110 (terminal No. 2) camshaft position sensor connector and A-114 (terminal No. 12) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for open circuit.

NO : Repair or replace the connector.

STEP 7. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

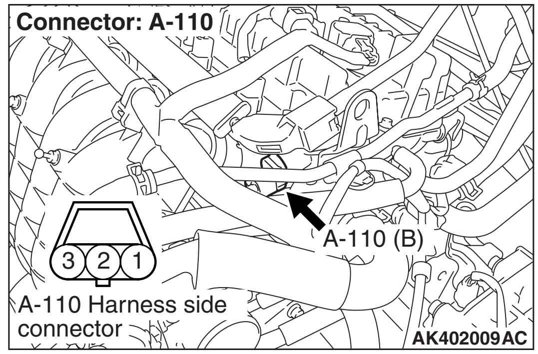


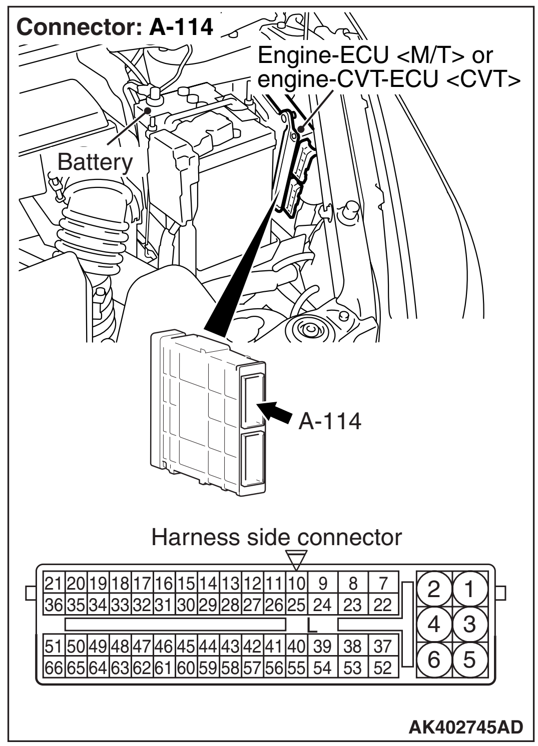
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace the connector.

STEP 8. Check harness between A-110 (terminal No. 2) camshaft position sensor connector and A-114 (terminal No. 12) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

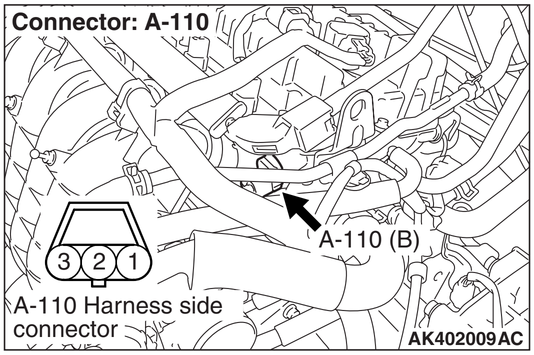
Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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STEP 10. Perform resistance measurement at A-110 camshaft position sensor connector.

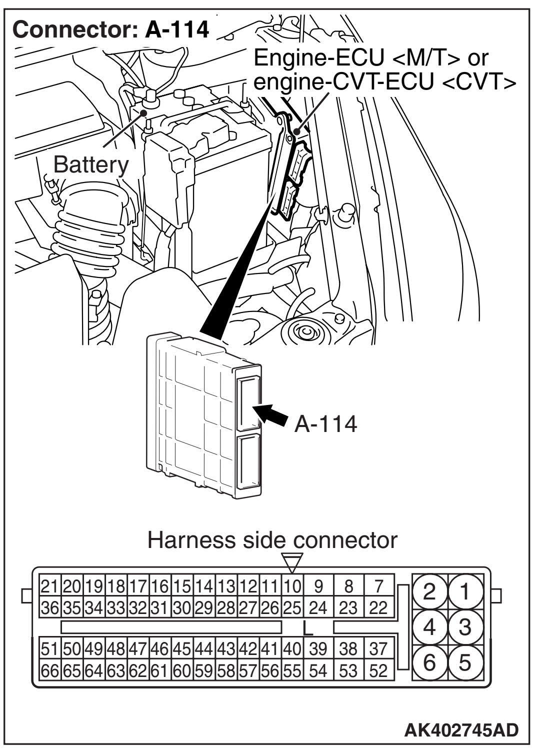


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

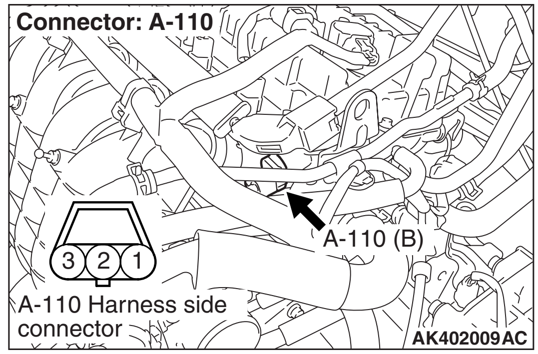
Q: Is the check result normal?
YES : Go to Step 13 .
NO : Go to Step 11 .

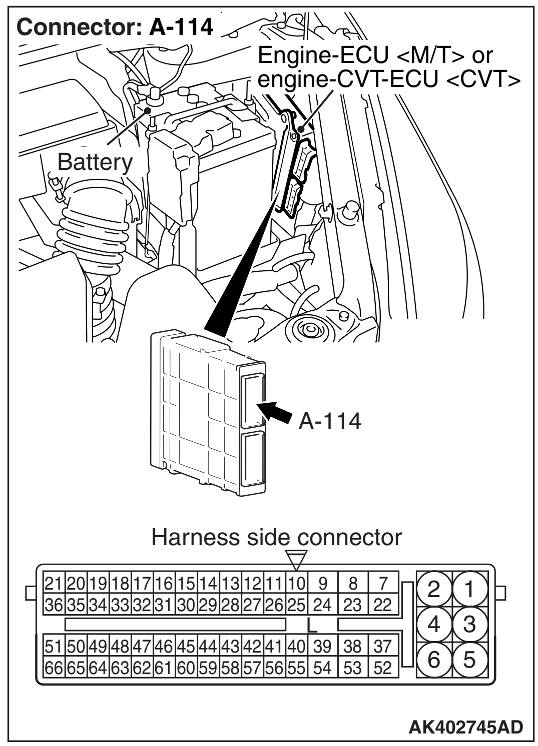
STEP 11. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



Q: Is the check result normal?
YES : Go to Step 12 .
NO : Repair or replace the connector.

STEP 12. Check harness between A-110 (terminal No. 1) camshaft position sensor connector and A-114 (terminal No. 27) engine-ECU connector or engine-CVT-ECU connector.



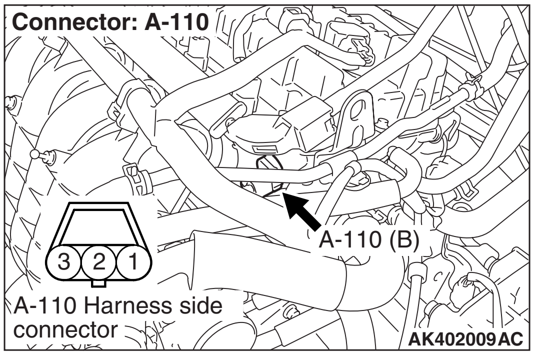


- Check earthing line for open circuit and damage.

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Repair the damaged harness wire.

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STEP 13. Perform output wave pattern measurement at A-110 camshaft position sensor connector (Using an oscilloscope).

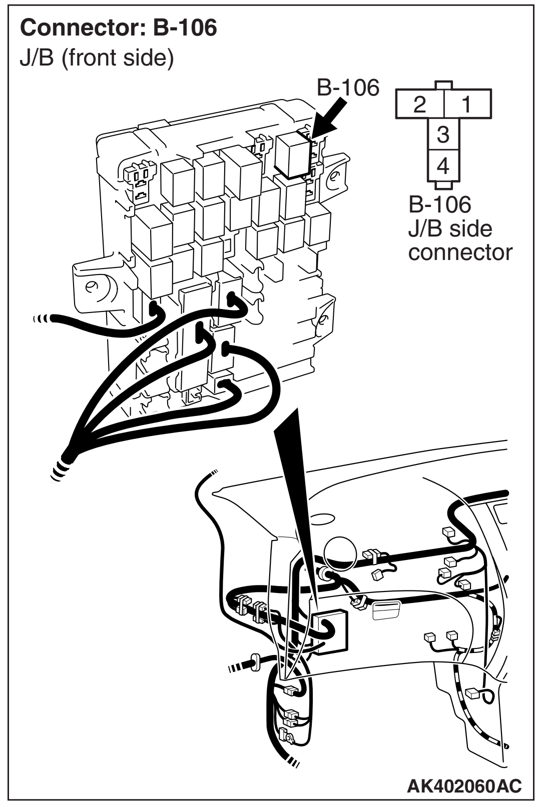


- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 2 and earth.

OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-348), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 14 .

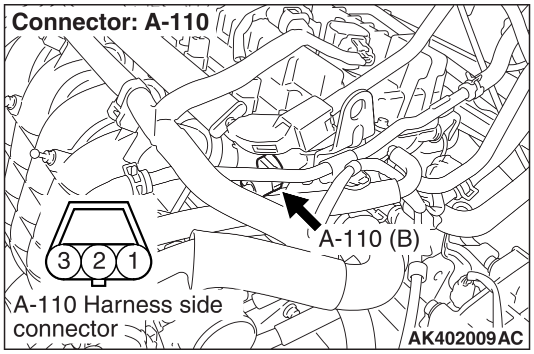
STEP 14. Connector check: B-106 engine control relay connector.

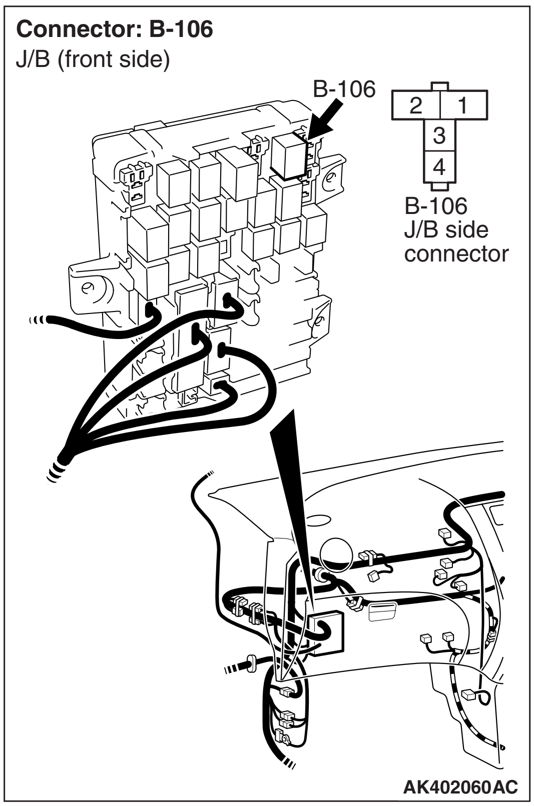


Q: Is the check result normal?
YES : Go to Step 15 .
NO : Repair or replace the connector.

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STEP 15. Check harness between A-110 (terminal No. 3) camshaft position sensor connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

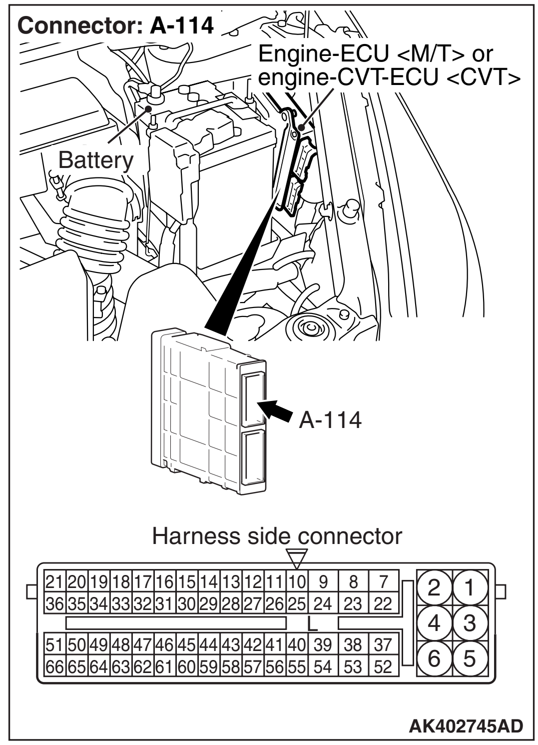
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair the damaged harness wire.

STEP 16. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



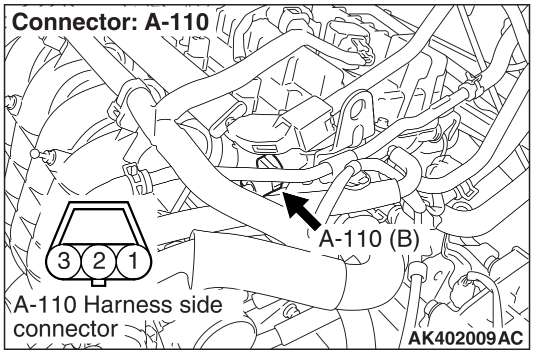
Q: Is the check result normal?

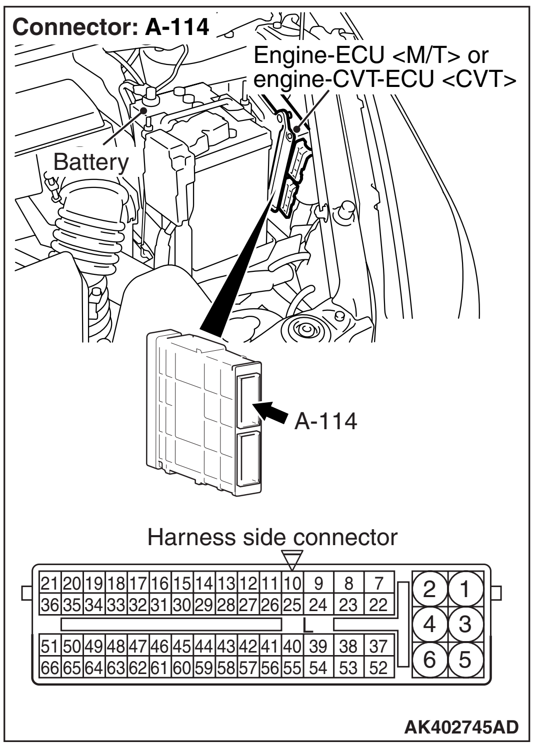
YES : Go to Step 17 .

NO : Repair or replace the connector.

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STEP 17. Check harness between A-110 (terminal No. 2) camshaft position sensor connector and A-114 (terminal No. 12) engine-ECU connector or engine-CVT-ECU connector.





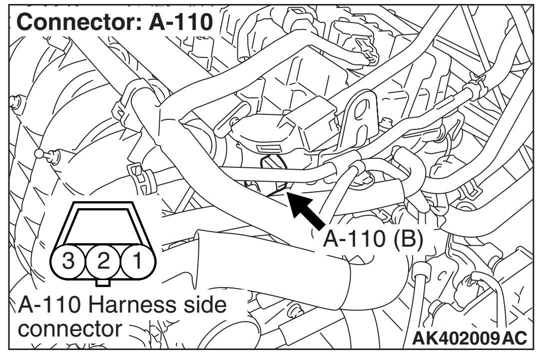
- Check output line for damage.

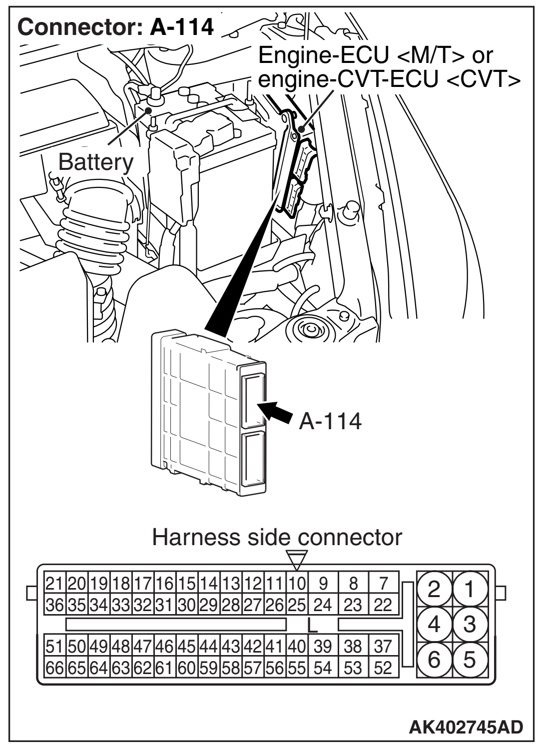
Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair the damaged harness wire.

STEP 18. Check harness between A-110 (terminal No. 1) camshaft position sensor connector and A-114 (terminal No. 27) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair the damaged harness wire.

STEP 19. Check camshaft position sensing cylinder.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Replace camshaft position sensing cylinder.

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STEP 20. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

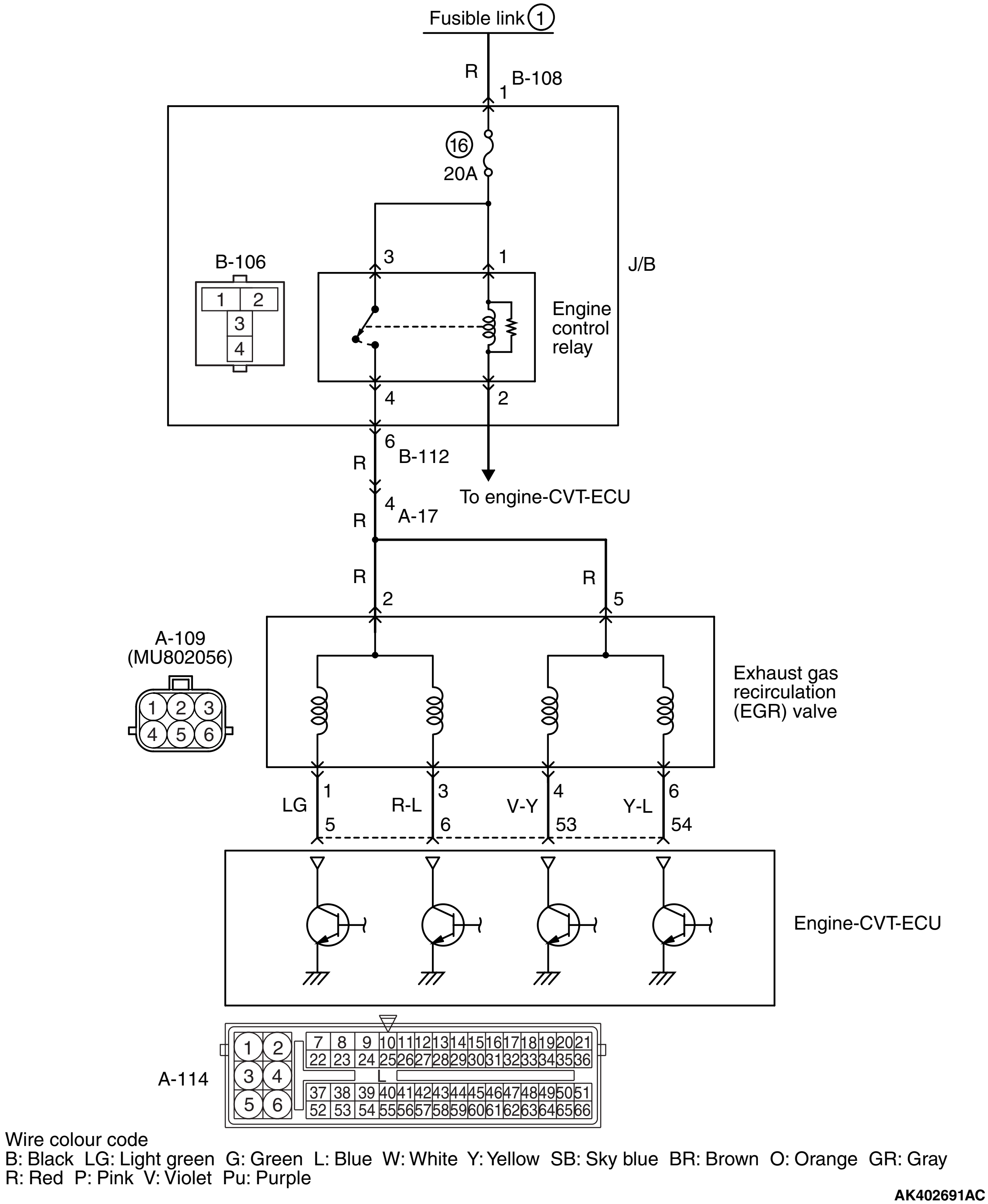
YES : Replace camshaft position sensor.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0403: Exhaust Gas Recirculation Control System <CVT>

EGR Valve Circuit



OPERATION

- Power is supplied to the EGR valve (terminal No. 2 and No. 5) from the engine control relay (terminal No. 4).
- The engine-CVT-ECU (terminal No. 5, No. 6, No. 53 and No. 54) makes the power transistor in the unit be in ON, and that makes currents go on the EGR valve (terminal No. 1, No. 3, No. 4 and No. 6).

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FUNCTION

- Based on the signal from engine-CVT-ECU, the EGR valve (stepper motor) controls the EGR rate.

TROUBLE JUDGMENT

Check Conditions

- When the ignition switch is turned to ON position from OFF position.

or

- EGR valve is in operation after the engine starting process is completed.

Judgment Criterion

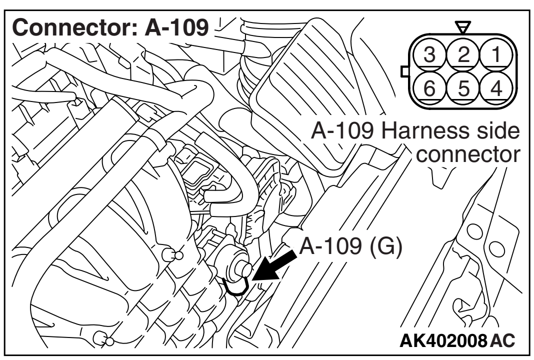
- Off-surge voltage is not generated from motor coil while the EGR valve motor is running.

PROBABLE CAUSES

- Failed EGR valve
- Open/short circuit in EGR valve circuit or loose connector contact
- Failed engine-CVT-ECU

DIAGNOSIS PROCEDURE

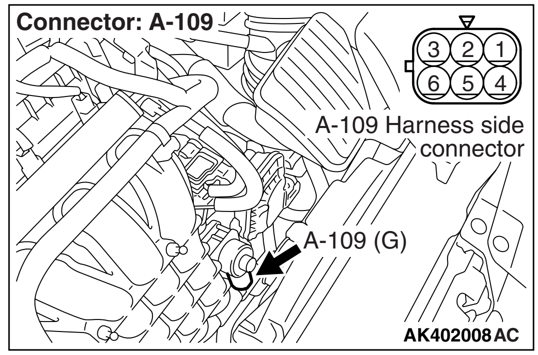
STEP 1. Connector check: A-109 EGR valve connector



Q: Is the check result normal?

YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at A-109 EGR valve connector.



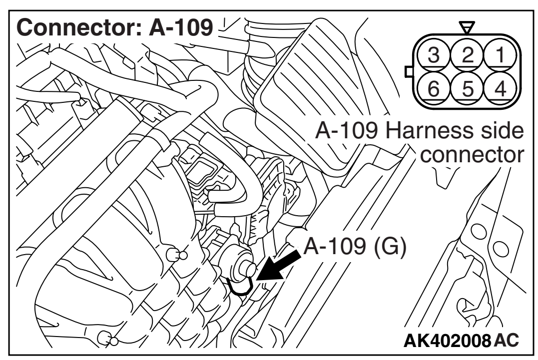
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and No. 2.
- Resistance between terminal No. 2 and No. 3.
- Resistance between terminal No. 4 and No. 5.
- Resistance between terminal No. 5 and No. 6.

OK: 20 – 24 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 3 .
NO : Replace EGR valve.

STEP 3. Perform voltage measurement at A-109 EGR valve connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2, No. 5 and earth.

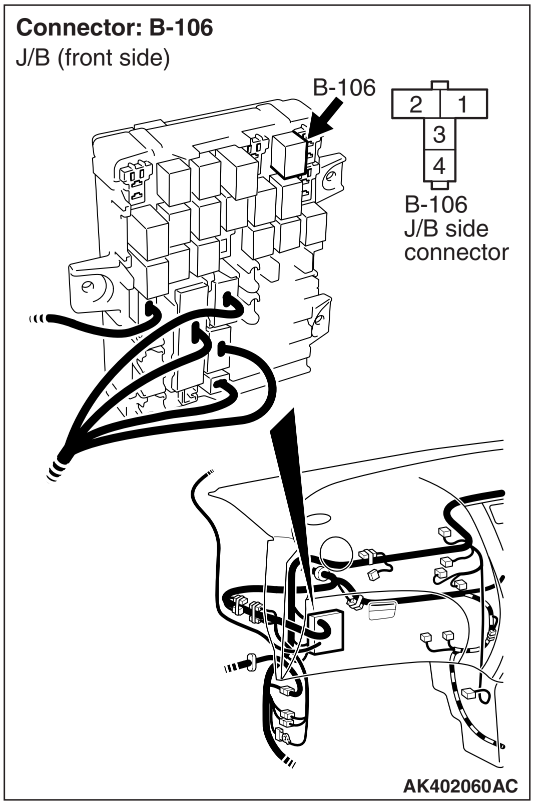
OK: System voltage

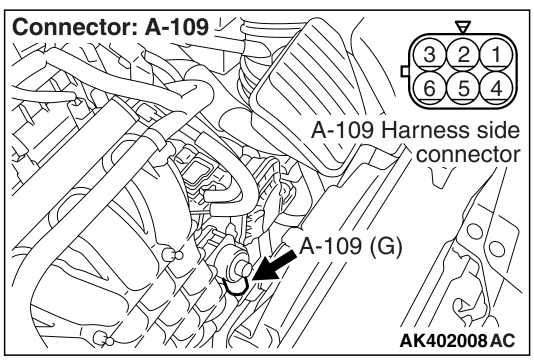
Q: Is the check result normal?

YES : Go to Step 5 .
NO : Go to Step 4 .

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STEP 4. Connector check: B-106 engine control relay connector





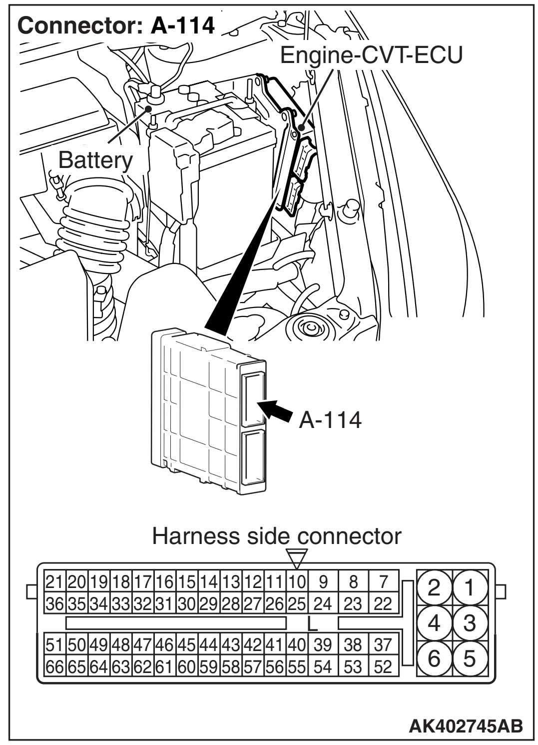
Q: Is the check result normal?

YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-109 (terminal No. 2, No. 5) EGR valve connector and B-106 (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Connector check: A-114 engine-CVT-ECU connector

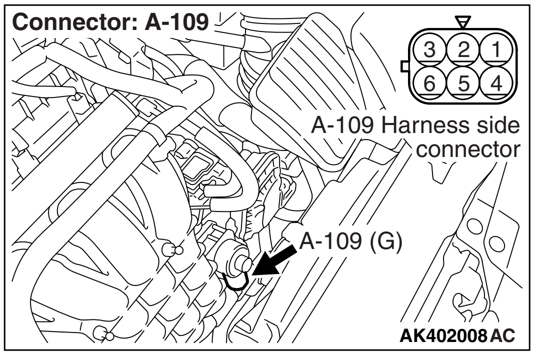


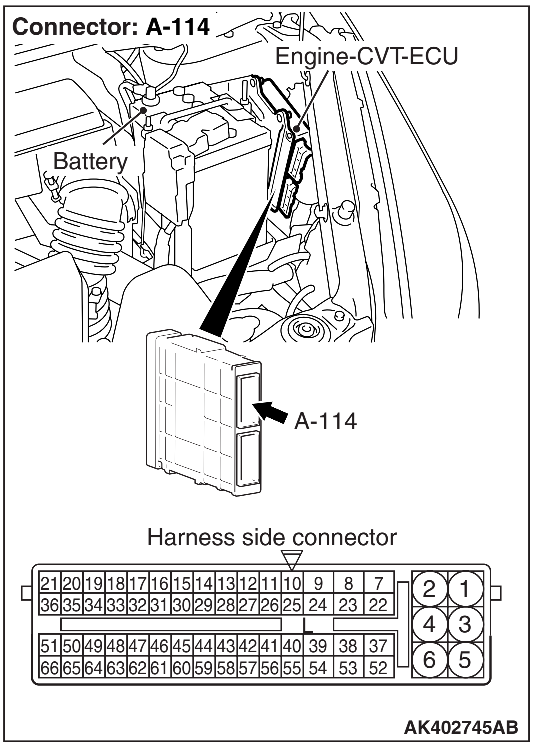
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

STEP 6. Check harness between A-109 EGR valve connector and A-114 engine-CVT-ECU connector.





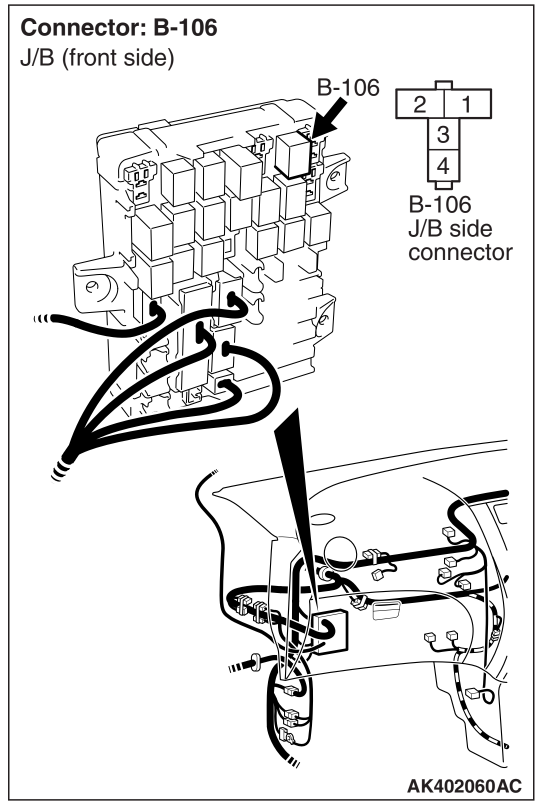
a. Check harness between A-109 (terminal No. 1) EGR valve and A-114 (terminal No. 5) engine-CVT-ECU connector.
b. Check harness between A-109 (terminal No. 3) EGR valve and A-114 (terminal No. 6) engine-CVT-ECU connector.
c. Check harness between A-109 (terminal No. 4) EGR valve and A-114 (terminal No. 53) engine-CVT-ECU connector.
d. Check harness between A-109 (terminal No. 6) EGR valve and A-114 (terminal No. 54) engine-CVT-ECU connector.

- Check output line for open/short circuit and damage.

Q: Are the check results normal?

YES : Go to Step 7 .
NO : Repair the damaged harness wire.

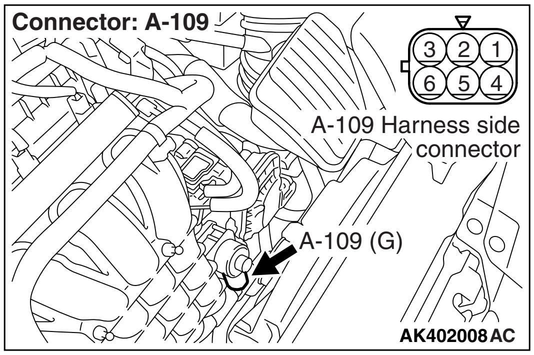
STEP 7. Connector check: B-106 engine control relay connector

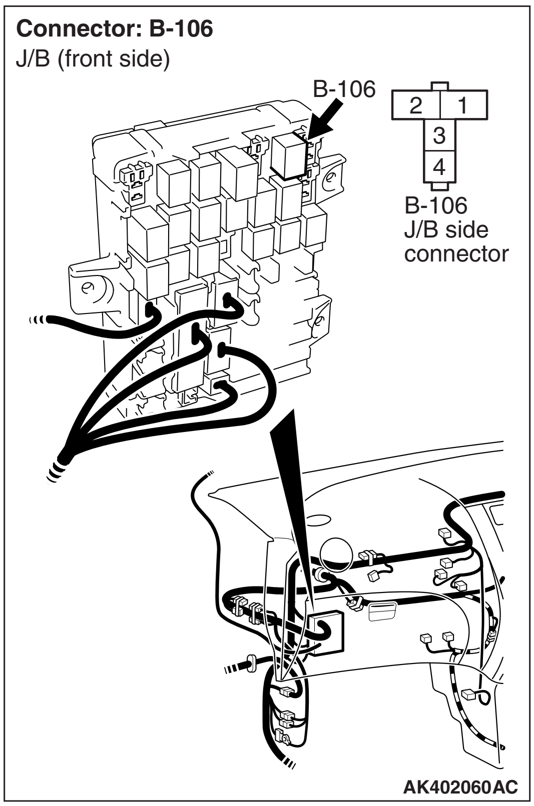


Q: Is the check result normal?

YES : Go to Step 8 .
NO : Repair or replace the connector.

STEP 8. Check harness between A-109 (terminal No. 2, No. 5) EGR valve connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace engine-CVT-ECU.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0421: Warm Up Catalyst Malfunction

FUNCTION

- The signal from the oxygen sensor (rear) differs from the oxygen sensor (front). That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the oxygen sensor (front) becomes similar to the oxygen sensor (rear).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> compares the output of the oxygen sensor signals (front and rear).

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 3,000 r/min or lower.
- The accelerator pedal is open.
- 3 seconds or more elapsed after the above mentioned conditions were satisfied.
- Under the closed loop air/fuel ratio control.
- Vehicle speed is 1.5 km/h or higher.
- For 10 seconds per cycle, the engine-ECU <M/T> or engine-CVT-ECU <CVT> monitors 7 cycles of this condition during the drive cycle.
- Short-term fuel trim is between –25 % or higher and +25 % or lower.

Judgment Criterion

- The oxygen sensor (rear) signal frequency divided by oxygen sensor (front) signal frequency is 0.8 or more.

PROBABLE CAUSES

- Catalytic converter deteriorated
- Failed oxygen sensor (front)
- Failed oxygen sensor (rear)
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check for leakage of exhaust emission from exhaust manifold.

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair.

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 11: Oxygen sensor (front)
  b. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?
YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data valve (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. M.U.T.-III data list

- Item 11: Oxygen sensor (front)

  OK: 0 – 0.4 and 0.6 – 1.0 volt should alternate 15 times or more within 10 seconds (engine speed at 2,000 r/min).

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the oxygen sensor (front).

STEP 4. Replace the oxygen sensor (rear).

- After replacing the oxygen sensor (rear), re-check the trouble symptoms.

Q: Is the check result normal?
YES : Check end.
NO : Go to Step 5 .

STEP 5. Replace the catalytic converter.

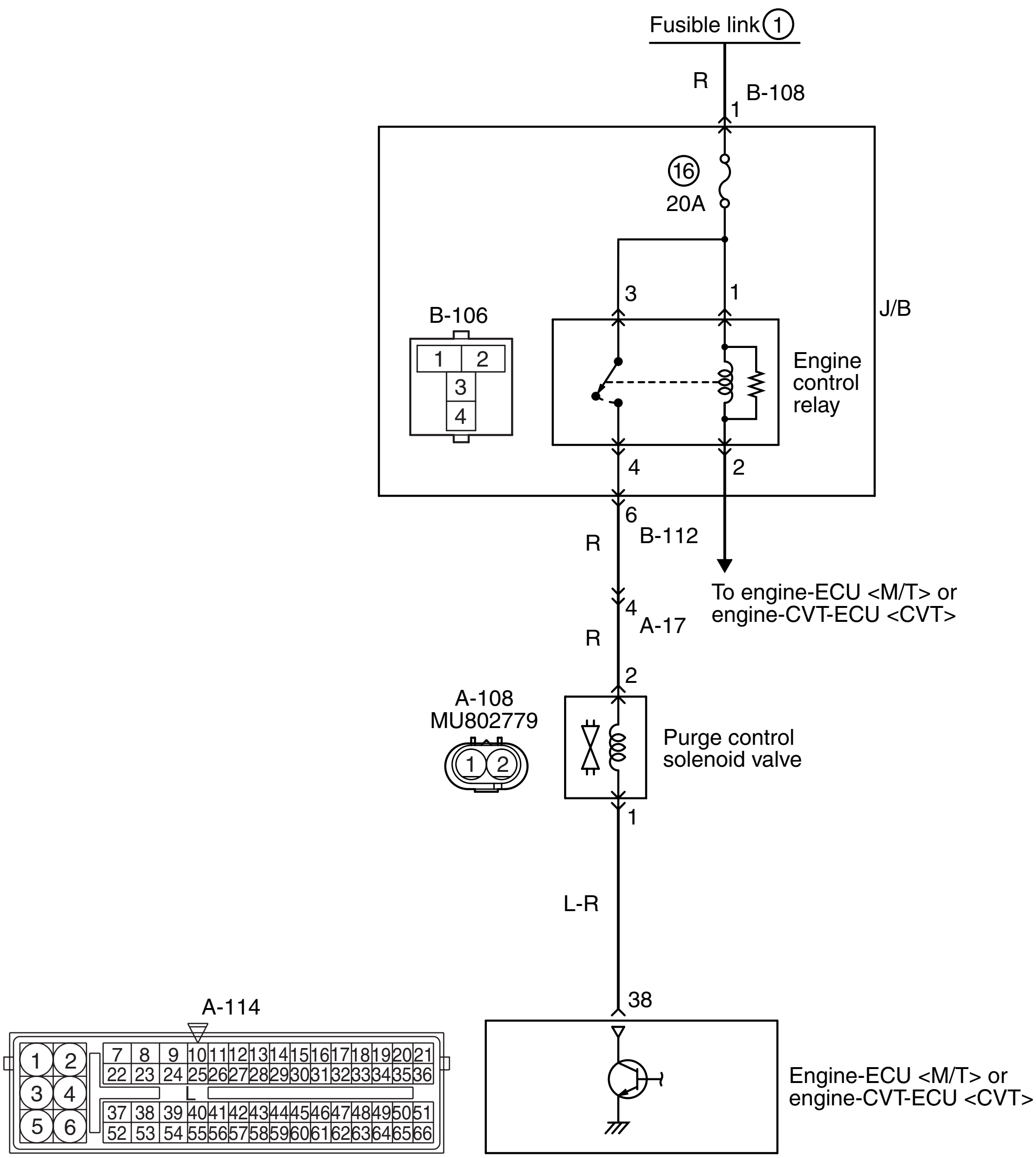
- After replacing the catalytic converter, re-check the trouble symptoms.

Q: Is the check result normal?
YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Check end.

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Code No. P0443: Purge Control Solenoid Valve System

Purge Control Solenoid Valve Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402707AC

OPERATION

- Power is supplied to the purge control solenoid valve (terminal No. 2) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 38) makes the power transistor in the unit be in ON position, and that makes currents go on the purge control solenoid valve (terminal No. 1).

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FUNCTION

- In response to a signal from the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the purge control solenoid valve controls the flow rate of the purge air to be introduced into the surge tank.

TROUBLE JUDGMENT

Check Conditions

- Engine is running <M/T>.
- Battery positive voltage is more than 10 V and is less than 16 V <M/T>.
- Engine speed is more than 1,200 r/min and is less than 3,000 r/min <M/T>.
- Ignition switch is in ON position <CVT>.
- Battery positive voltage is 10 V or higher <CVT>.

Judgment Criterion

- The surge voltage (system voltage +2 V) of solenoid coil is not detected when the purge control solenoid valve is turned in OFF position from ON.

PROBABLE CAUSES

- Failed purge control solenoid valve
- Open/short circuit in purge control solenoid value circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III actuator test

- Item 08: Purge control solenoid valve

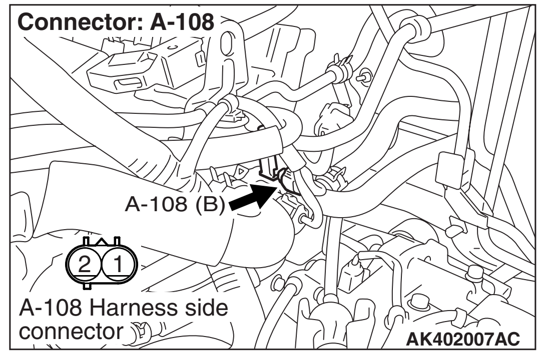
OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-108 purge control solenoid valve connector

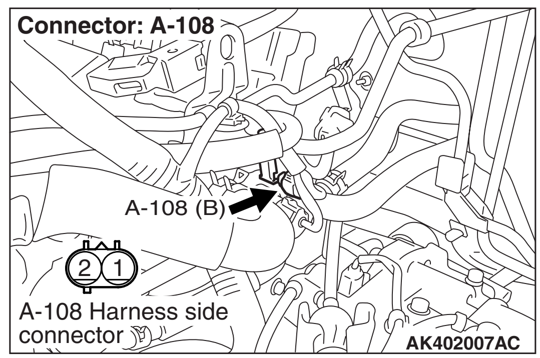


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-108 purge control solenoid valve connector.



- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 30 – 34 Ω (at 20°C)

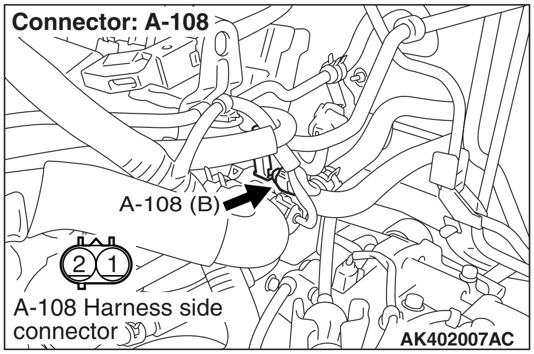
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace purge control solenoid valve.

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STEP 4. Perform voltage measurement at A-108 purge control solenoid valve connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

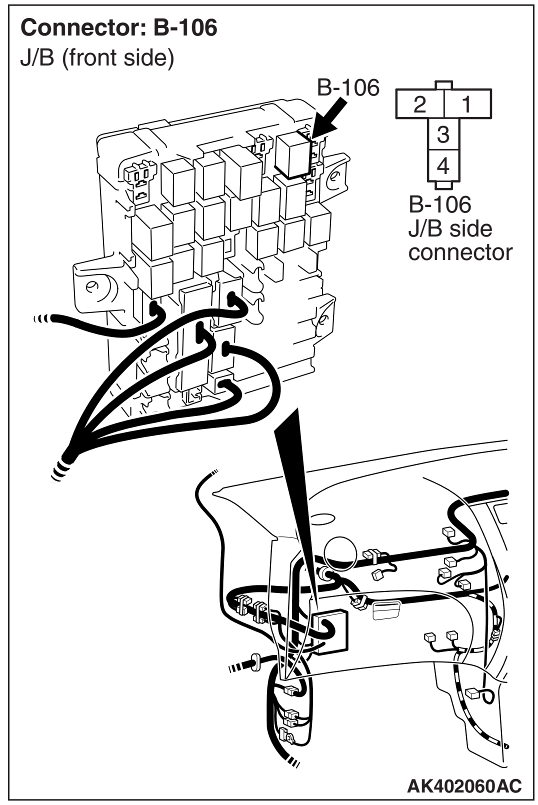
OK: System voltage

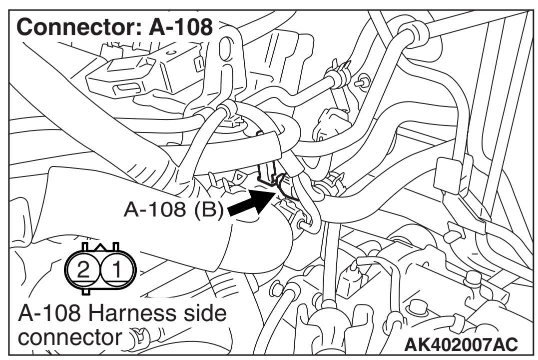
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-106 engine control relay connector





Q: Is the check result normal?

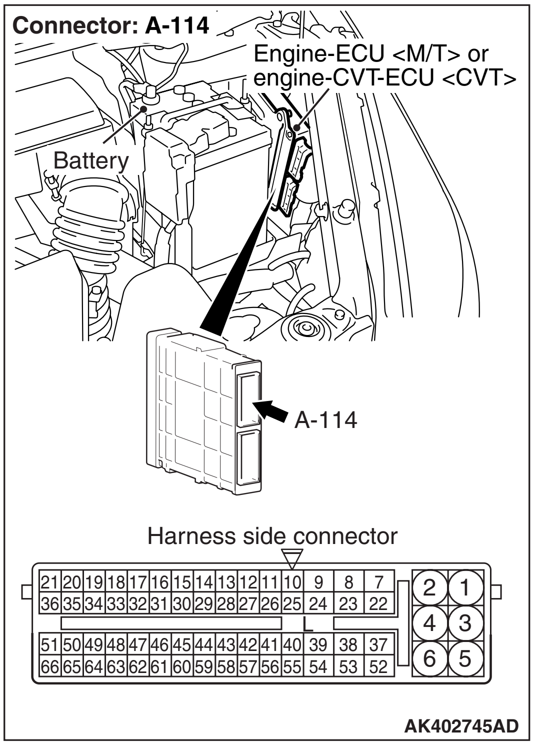
YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connector is normal, check and repair harness between A-108 (terminal No. 2) purge control solenoid valve connector and B-106 (terminal No. 4) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair or replace the connector.

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STEP 6. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



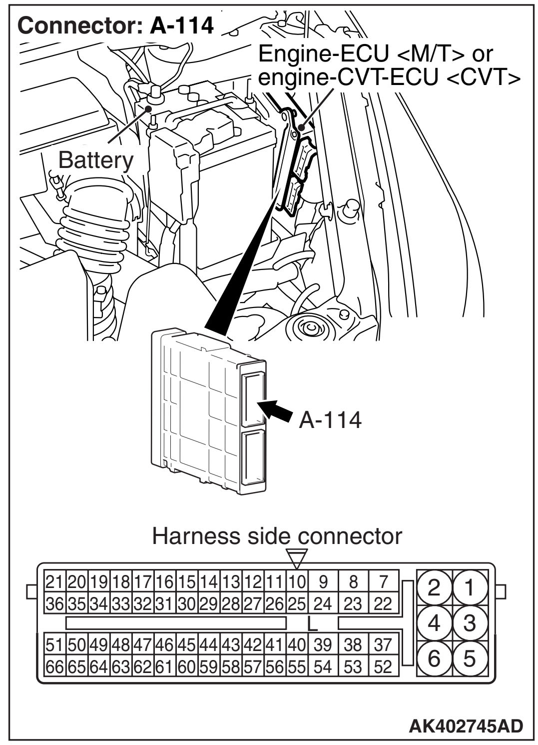
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

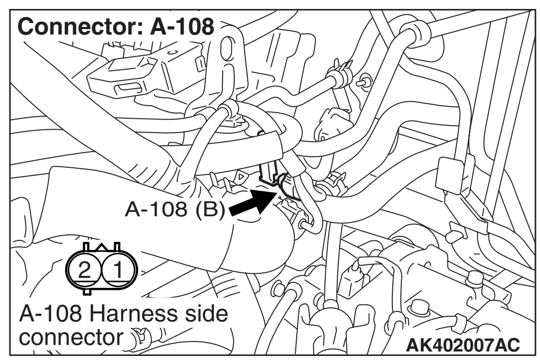
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .
NO : Go to Step 7 .

STEP 7. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



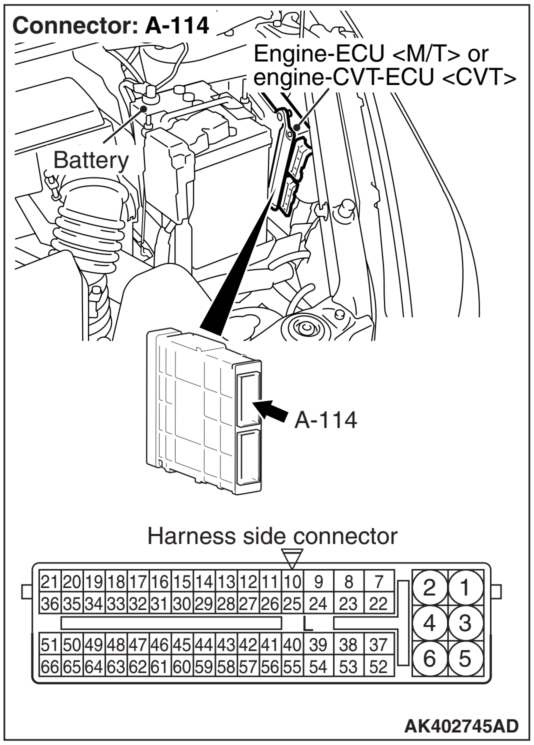


Q: Is the check result normal?

YES : Check and repair harness between A-108 (terminal No. 1) purge control solenoid valve connector and A-114 (terminal No. 38) engine-ECU connector or engine-CVT-ECU connector.
- Check output line for open/short circuit.

NO : Repair or replace the connector.

STEP 8. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

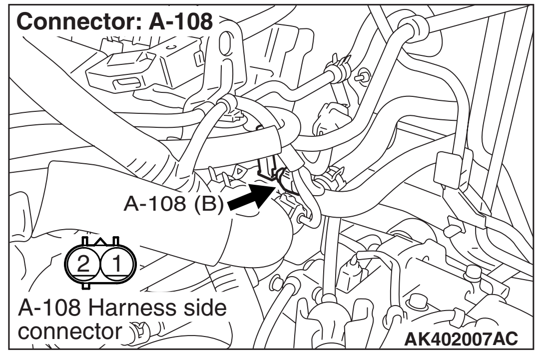


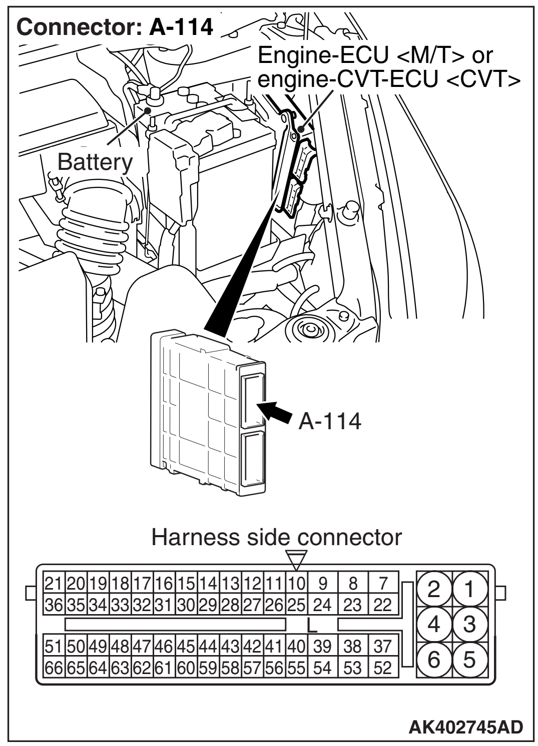
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace the connector.

STEP 9. Check harness between A-108 (terminal No. 1) purge control solenoid valve connector and A-114 (terminal No. 38) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

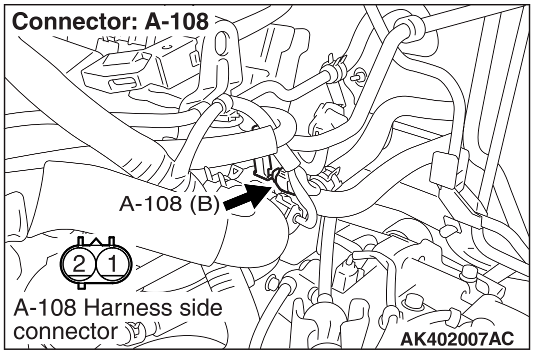
Q: Is the check result normal?

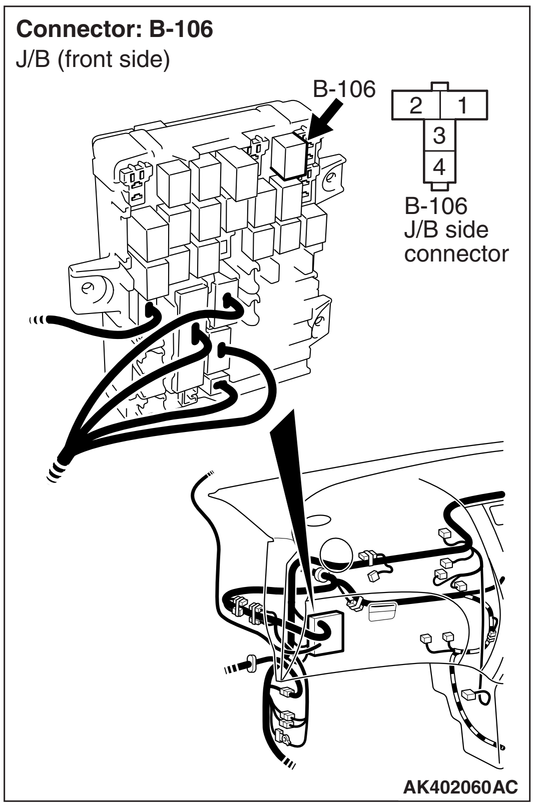
YES : Go to Step 10 .

NO : Repair the damaged harness wire.

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STEP 10. Check harness between A-114 (terminal No. 2) purge control solenoid valve connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector A-17 and B-112, and repair if necessary.

- Check power line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair the damaged harness wire.

STEP 11. M.U.T.-III actuator test

- Item 08: purge control solenoid valve

OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to Group 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P0500: Vehicle Speed Signal System <M/T>

FUNCTION

- The vehicle speed signals are input to engine-ECU from ABS-ECU through CAN communication.

TROUBLE JUDGMENT

Check Conditions

- 2 seconds later after the ignition switch has been in "ON" position or the engine has started up.
- Engine speed is 2,500 – 4,000 r/min.
- Under the high load operation

Judgment Criteria

- For 4 seconds, the vehicle speed information received using the CAN does not change.

or

- For 4 seconds, the vehicle speed information received using the CAN is abnormal.

PROBABLE CAUSES

- Failed ABS-ECU
- Failed CAN
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is diagnosis code related with CAN communication displayed?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 2 .

STEP 2. M.U.T.-III other system diagnosis code

- Confirm whether the diagnosis codes are output from ABS-ECU.

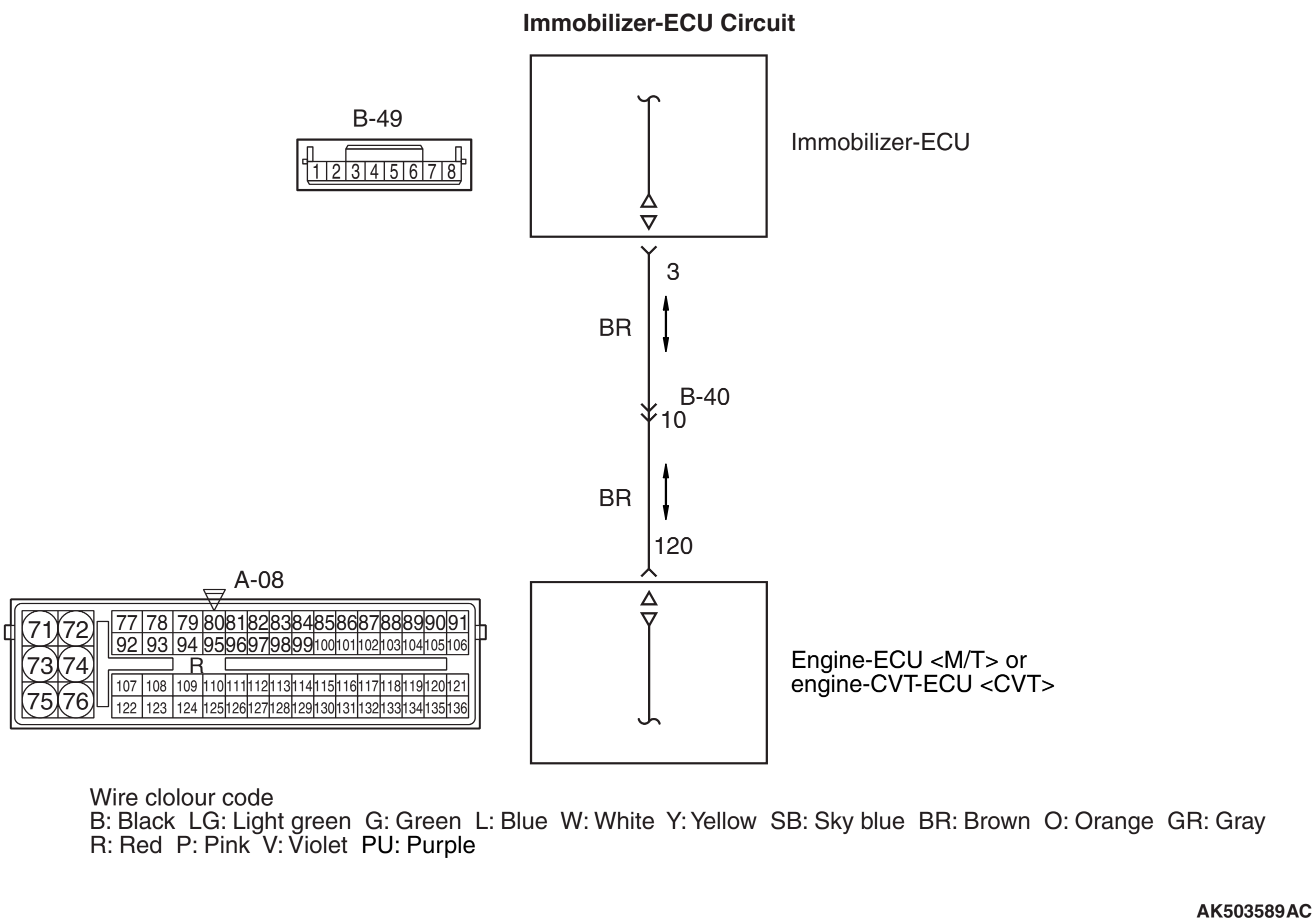
Q: Is the diagnosis code output?

YES : Perform the troubleshooting of ABS (Refer to GROUP 35B – Troubleshooting – Check Chart for Diagnosis Code P.35B-7).

NO : Replace the engine-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0513: Immobilizer Malfunction



OPERATION

- The signals are sent and received between engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 120) and immobilizer-ECU (terminal No. 3).

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> sends or receives the control signals to or from immobilizer-ECU to certify the ignition key.

NOTE:
- *If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.*
- *This code may be displayed when registering the key encrypted code.*

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

- The communication error between engine-ECU <M/T> or engine-CVT-ECU <CVT> and the immobilizer-ECU for 4 seconds.

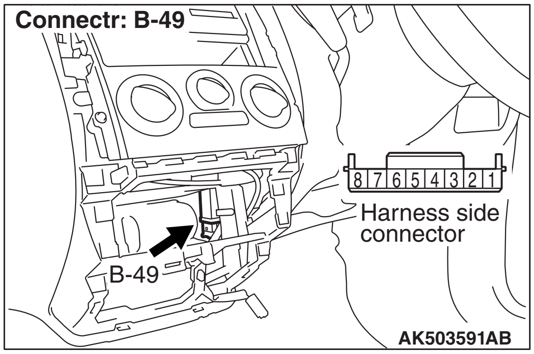
PROBABLE CAUSES

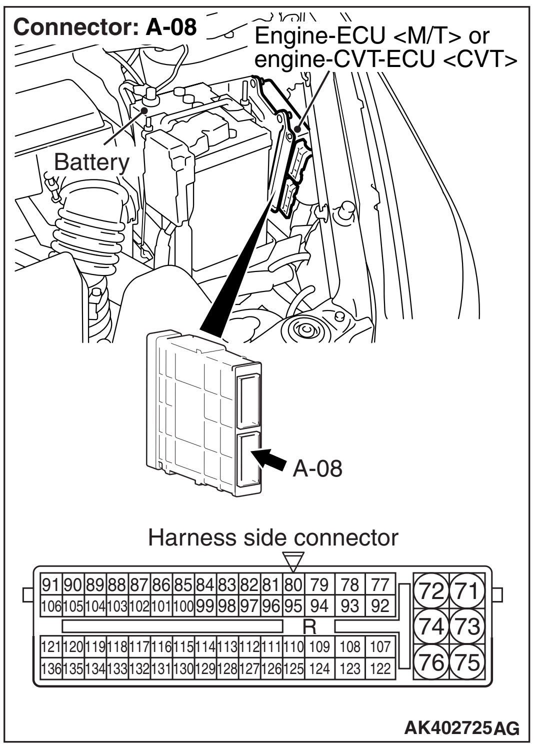
- Open/short circuit in immobilizer system circuit or loose connector contact
- Failed immobilizer-ECU
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

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DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-49 immobilizer-ECU connector and A-08 engine-ECU connector or engine-CVT-ECU connector.



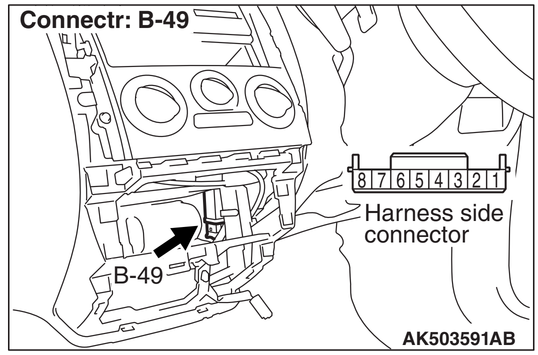


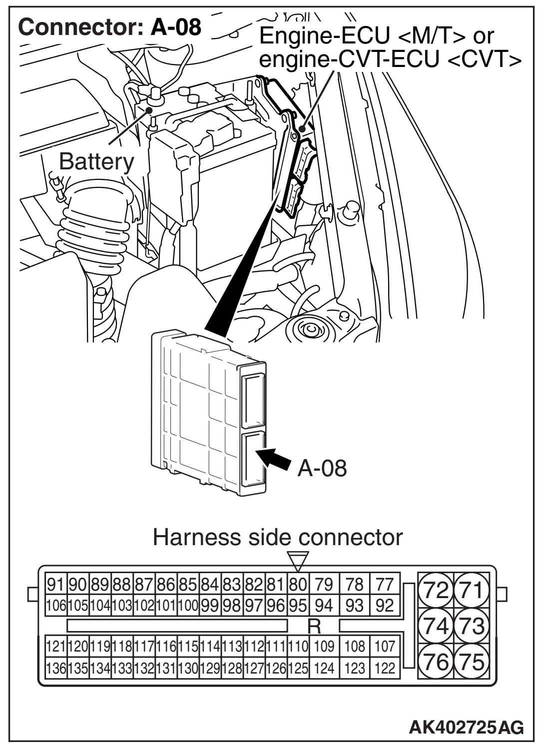
Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check harness between B-49 (terminal No. 3) immobilizer-ECU connector and A-08 (terminal No. 120) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connector B-40, and repair if necessary.

- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check the trouble symptoms.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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STEP 4. After replacing the immobilizer-ECU, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Check end.

Code No. P0603: EEP ROM MALFUNCTION

FUNCTION

- To check whether the information such as the idle learned value and so on is stored in the memory of engine-ECU <M/T> or engine-CVT-ECU <CVT>.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in ON position.

Judgement Criterion

- The latest learned data that was flashed while the ignition switch was in OFF position are not stored correctly.

PROBABLE CAUSE

- Failed the engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0606: Microcomputer Malfunction System

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> check whether the microcomputer, which performs the drive control of the throttle valve, is normal.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is ON position.

Judgment Criteria

- Battery voltage is more than 6.3 V <M/T>.

or

- Main microcomputer reference voltage is abnormal.

PROBABLE CAUSE

- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

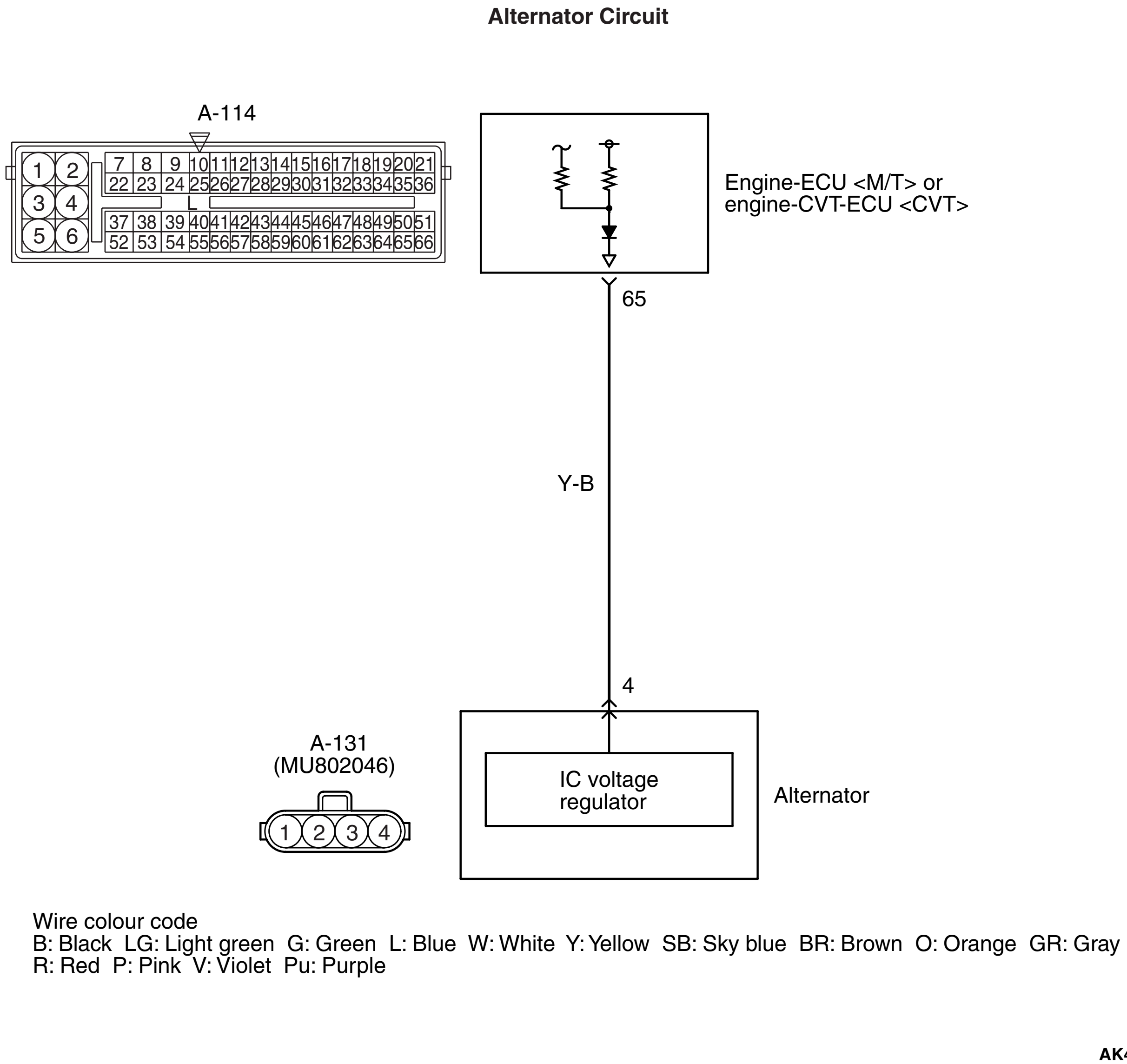
Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0622: Alternator FR Terminal System



OPERATION

- The energized state of the alternator field coil is inputted from the alternator (terminal No. 4) to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 65).

FUNCTION

- A signal of the power supply duty ratio for the alternator field coil is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> detects the alternator output current and controls the idling speed according to the output current (electric load).

TROUBLE JUDGMENT

Check Conditions

- After engine starts <M/T>
- Engine speed is 50 r/min or higher <CVT>.

Judgment Criterion

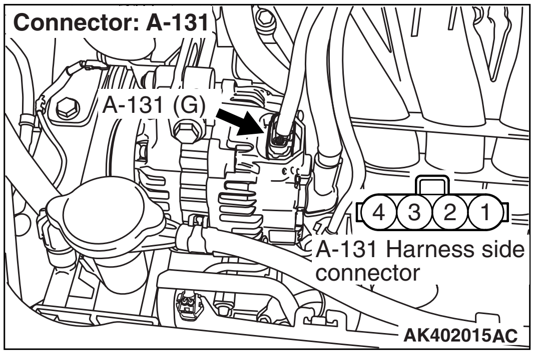
- Input voltage from the alternator FR terminal has continued to be system voltage for 20 seconds.

PROBABLE CAUSES

- Failed alternator
- Open/short circuit in alternator FR terminal circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-131 alternator connector

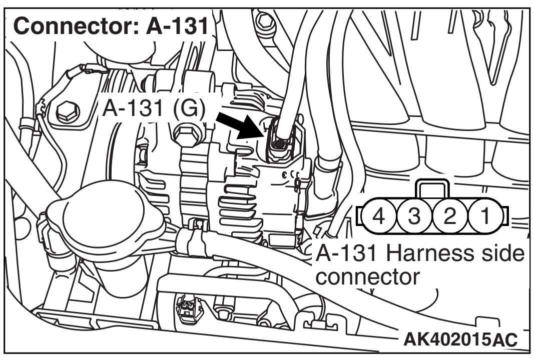


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at A-131 alternator connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

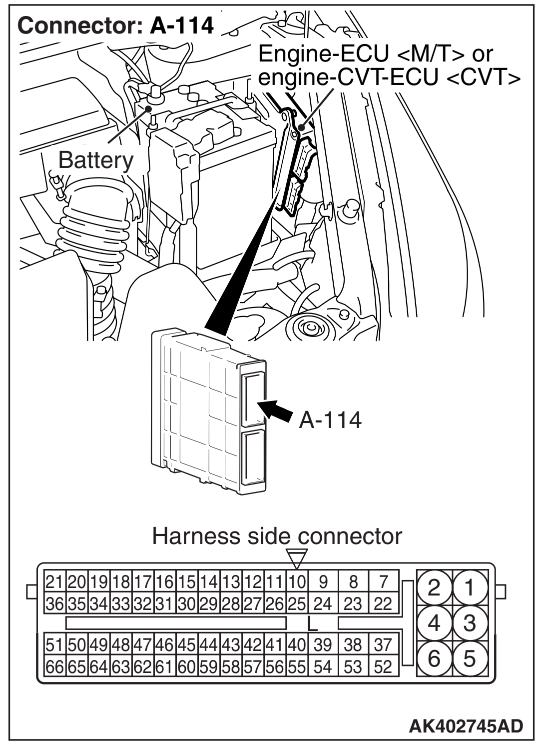
OK: system voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 3 .

STEP 3. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



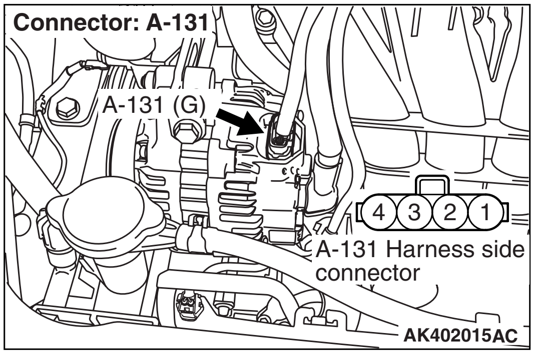
Q: Is the check result normal?

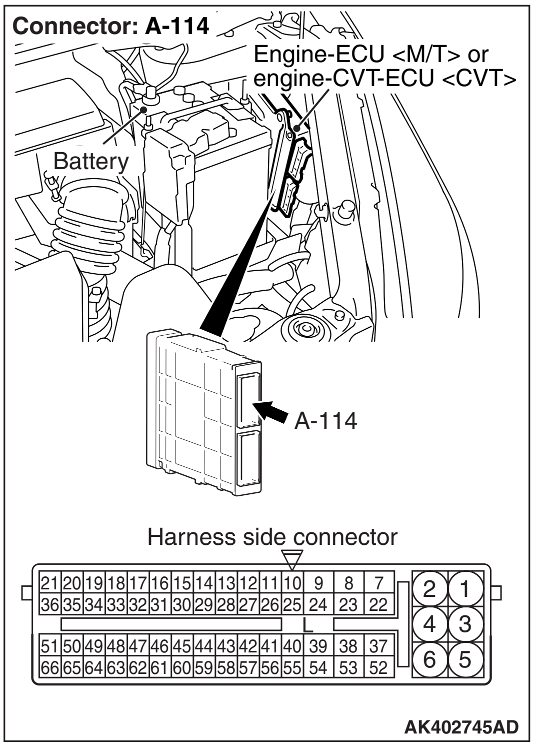
YES : Go to Step 4 .

NO : Repair or replace the connector.

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STEP 4. Check harness between A-131 (terminal No. 4) alternator connector and A-114 (terminal No. 65) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair the damaged harness wire.

STEP 5. M.U.T.-III diagnosis code

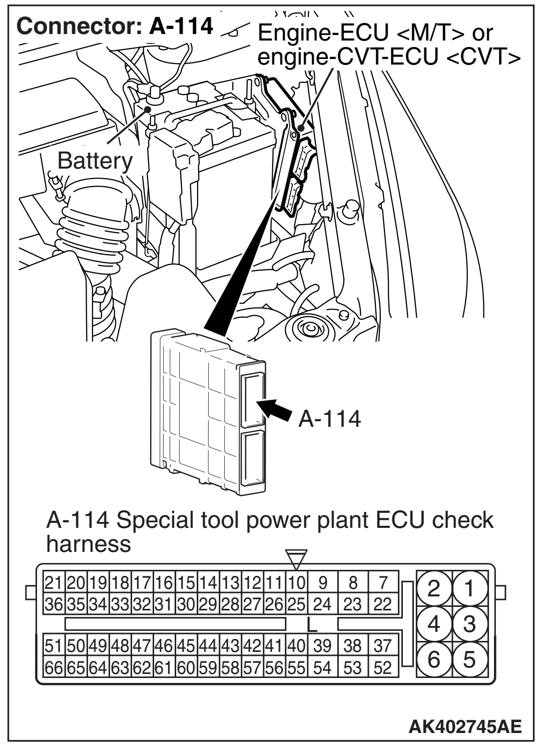
- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect special tool power plant ECU check harness (MB991987), and then measure the voltage on the check connector.
- Engine: Idle after warm-up
- Transmission: P range
- Radiator fan: Inactive
- Voltage between terminal No. 65 and earth.

OK: Switching the headlamps to ON from OFF causes the voltage to fall.

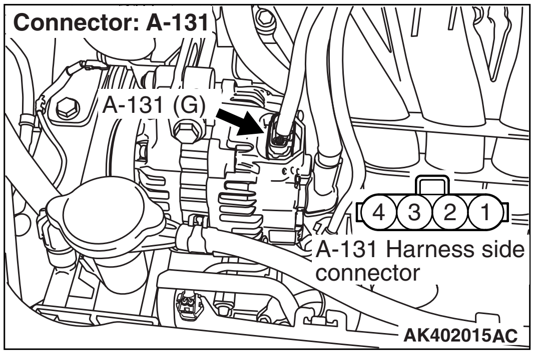
Q: Is the check result normal?

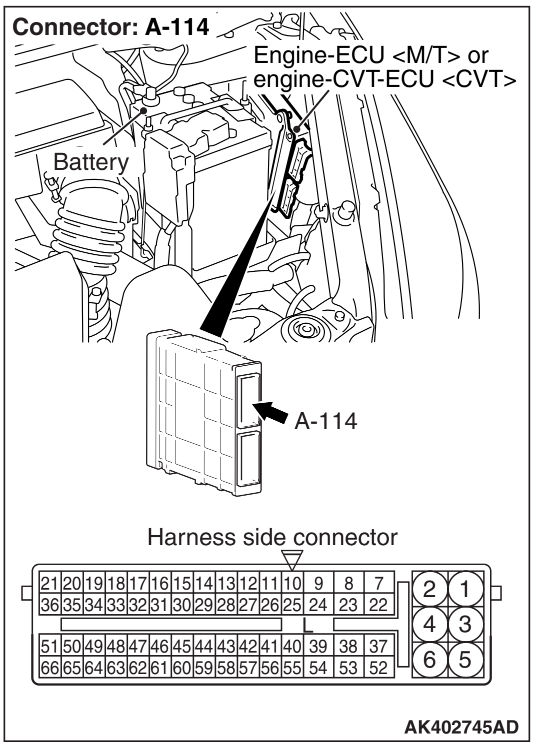
YES : Go to Step 9 .

NO : Go to Step 7 .

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STEP 7. Check harness between A-131 (terminal No. 4) alternator connector and A-114 (terminal No. 65) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace alternator.

NO : Intermittent malfunction (Refer to Group 00 – How to Use troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 9. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to Group 00 – How to Use troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0638: Throttle Valve Control Servo Circuit Range/Performance Problem

OPERATION

- Refer to P2101 – Throttle valve control servo circuit P.13A-198.

FUNCTION

- Engine-ECU <M/T> or engine-CVT-ECU <CVT> checks the electronic controlled throttle system for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Battery positive voltage is more than 8.3 V.
- When variation in throttle valve opening angle is small <M/T>
- Power is being supplied to the throttle valve control servo <CVT>
- Throttle position sensor (main) output voltage is 0.2 – 4.8 V.

Judgement Criteria (To targeted open degree, the valve is stuck at the open side.)

- When the variation in throttle valve position is small <CVT>.

or

- Throttle position sensor (main) output voltage has continued to be above 0.5 V higher than the target throttle position sensor (main) voltage.

Check Conditions

- Ignition switch is in "ON" position.
- Throttle position sensor is normal.

Judgement Criterion

- Throttle position sensor (main) mid opening learning value is 4.0 V or more.

PROBABLE CAUSES

- Failed throttle valve return spring.
- Failed throttle valve operation.
- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo connector contact.
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>.

DIAGNOSIS

STEP 1. Check throttle body.

- Check whether the throttle valve return spring is normal.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace the throttle body assembly.

STEP 2. Check the throttle valve control servo itself.

- Check the throttle valve control servo control motor itself (Refer to P.13A-366)

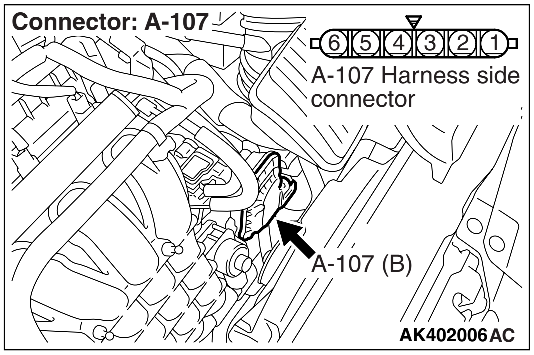
Q: Is the check result normal?

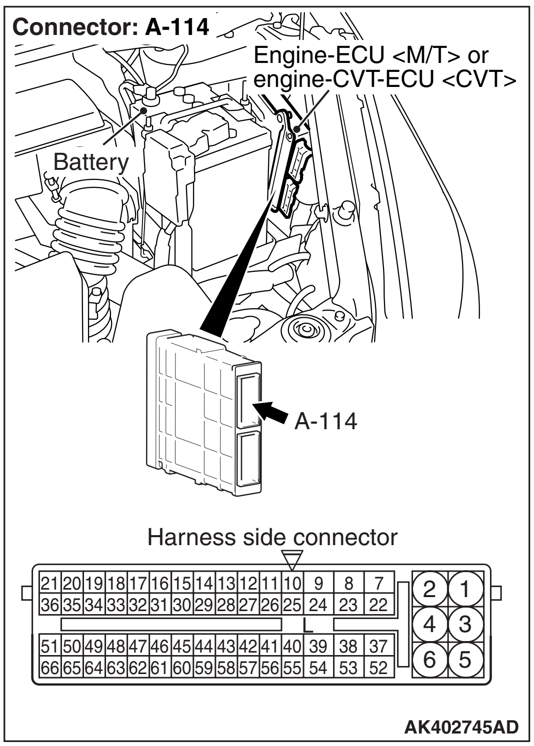
YES : Go to Step 3 .

NO : Replace electronic-controlled throttle valve.

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STEP 3. Connector check: A-107 electronic-controlled throttle valve connector and A-114 engine-ECU connector or engine-CVT-ECU connector



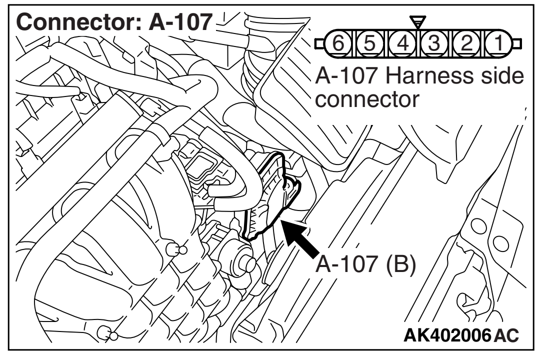


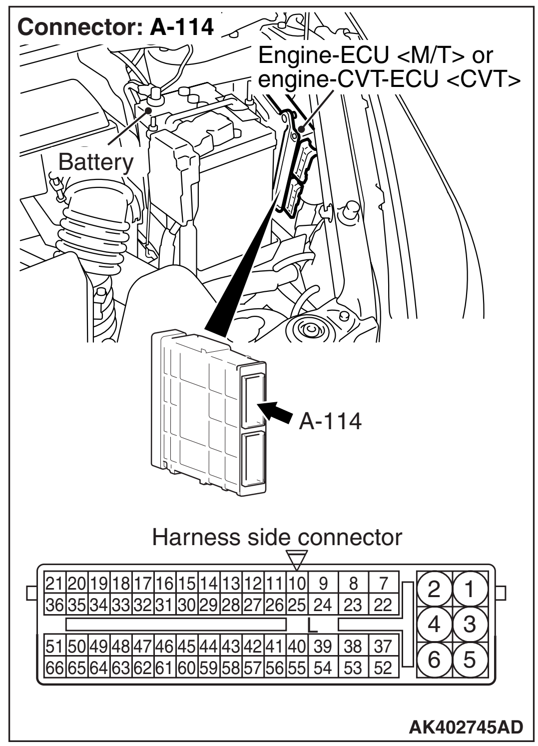
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace the connector.

STEP 4. Check harness between A-107 (terminal No. 1) electronic-controlled throttle valve connector and A-114 (terminal No. 7) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit and damage.

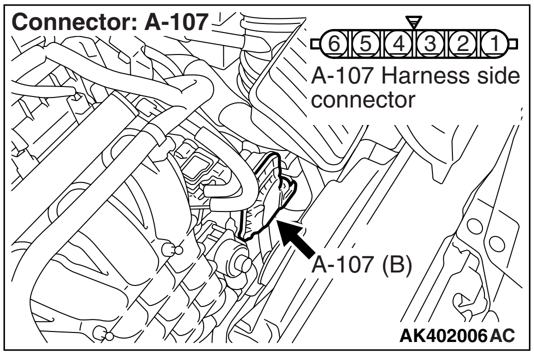
Q: Is the check result normal?

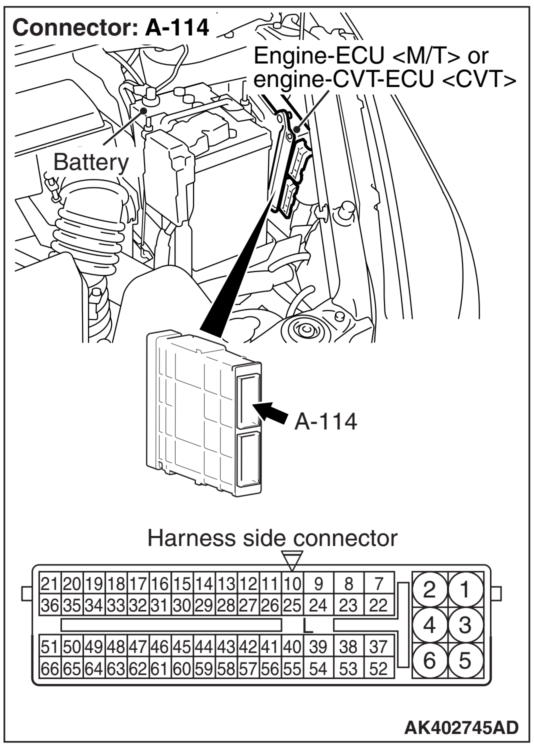
YES : Go to Step 5 .

NO : Repair the damaged harness wire.

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STEP 5. Check harness between A-107 (terminal No. 2) electronic-controlled throttle valve connector and A-114 (terminal No. 22) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0642: Throttle Position Sensor Power Supply

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks the throttle position sensor power voltage for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- Battery positive voltage is 6.3 V or higher.

Judgement Criteria

- Throttle position sensor power voltage is 4.1 V or less <M/T>.
- Throttle position sensor power voltage is 4.1 V or less for 0.3 seconds <CVT>.

PROBABLE CAUSE

- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. Check the trouble symptoms.

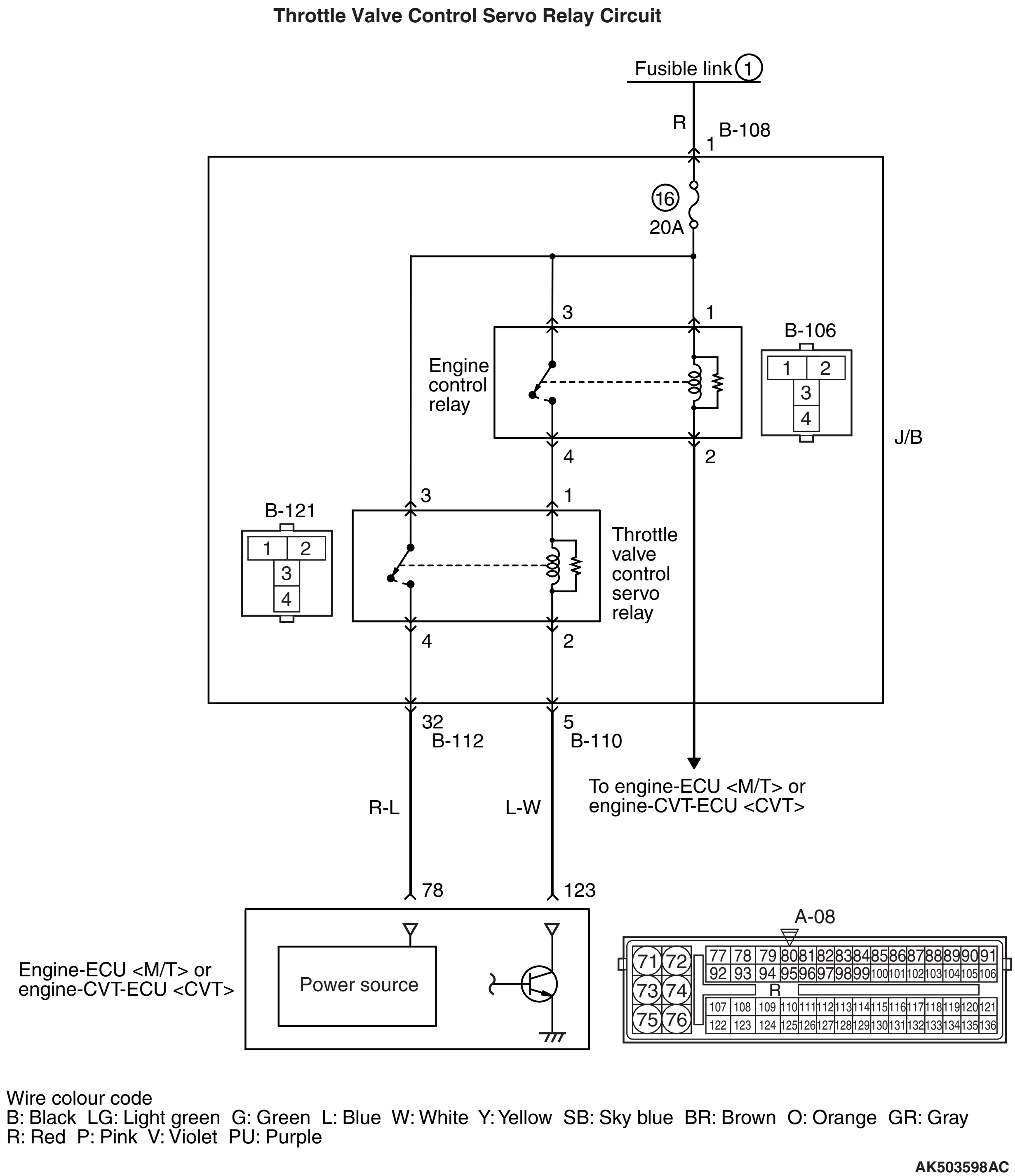
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0657: Throttle Valve Control Servo Relay Circuit Malfunction



OPERATION

- Battery voltage is applied to the throttle valve control servo relay terminal (terminal No. 3).
- Battery voltage is applied to the throttle valve control servo relay terminal (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 123) applies current to the throttle valve control servo relay coil by turning ON the power transistor in the unit in order to turn the relay ON.

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- When the throttle valve control servo relay turns ON, battery voltage is supplied by the throttle valve control servo relay (terminal No. 4) to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 78).

FUNCTION

- When the ignition switch ON signal is input into the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the engine-ECU <M/T> or engine-CVT-ECU <CVT> turns ON the Throttle valve control servo.

TROUBLE JUDGMENT

Check Conditions

- After engine starts <M/T>
- Ignition switch is in "ON" position <CVT>.

Judgement Criteria

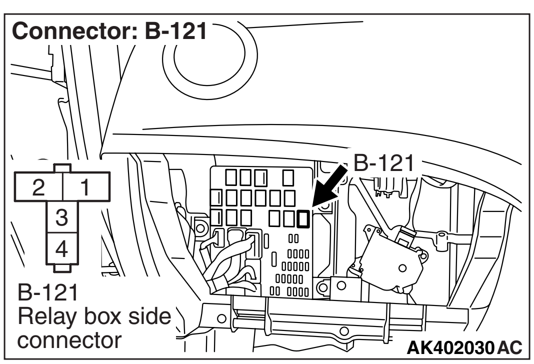
- Throttle valve control servo supply voltage is 6.0 V or less <M/T>.
- Battery voltage is 8.3 V or more <CVT>.
- The power line voltage of the electronic controlled throttle system is 6.0 V or less for 0.35 second <CVT>.

PROBABLE CAUSES

- Failed throttle valve return spring
- Open/short circuit in throttle valve control servo circuit or loose connector contact.
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. Connector check: B-121 throttle valve control servo relay connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Check throttle valve control servo relay itself.

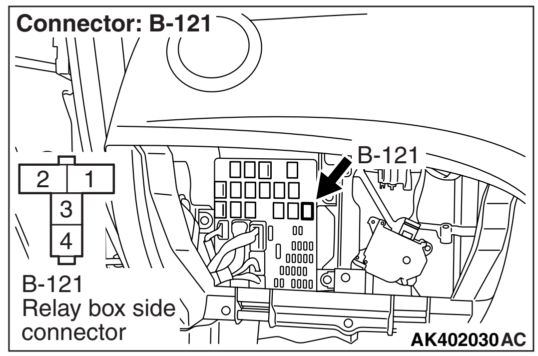
- Check throttle valve control servo relay (Refer to P.13A-361).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace the throttle valve control servo relay.

STEP 3. Perform voltage measurement at B-121 throttle valve control servo relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

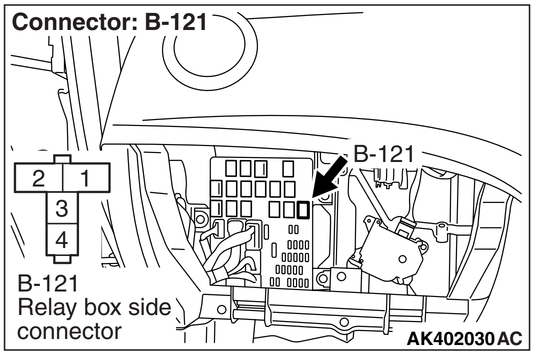
YES : Go to Step 4 .

NO : Check intermediate connector B-108, and repair if necessary. if intermediate connector is normal, Check and repair harness between B-121 (terminal No. 3) throttle valve control servo relay connector and battery.

- Check power supply line for open/short circuit.

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STEP 4. Perform voltage measurement at B-121 throttle valve control servo relay connector.



- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

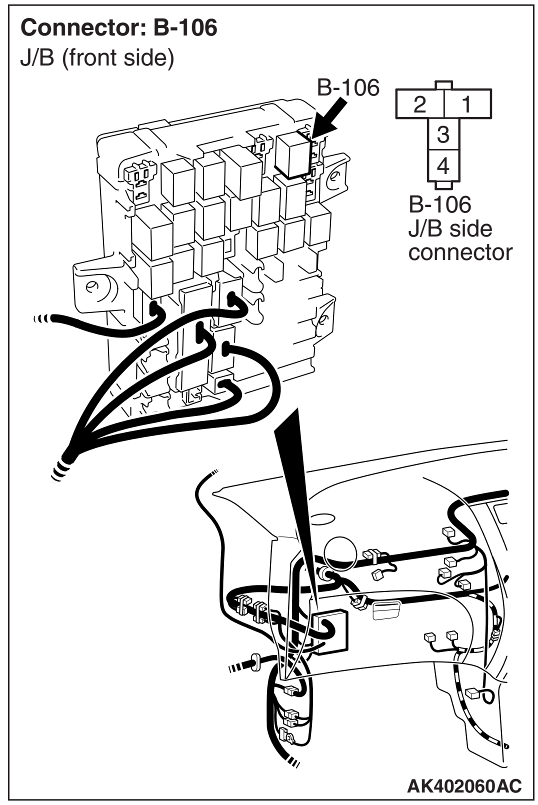
OK: System voltage

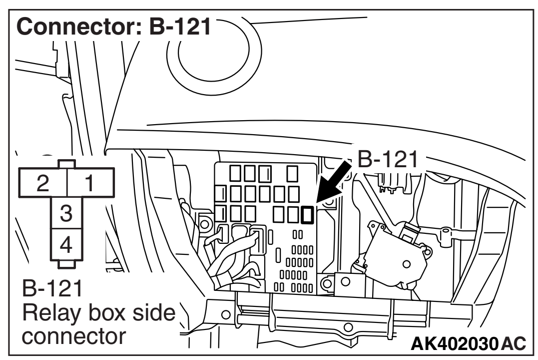
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-106 engine control relay connector





Q: Is the check result normal?

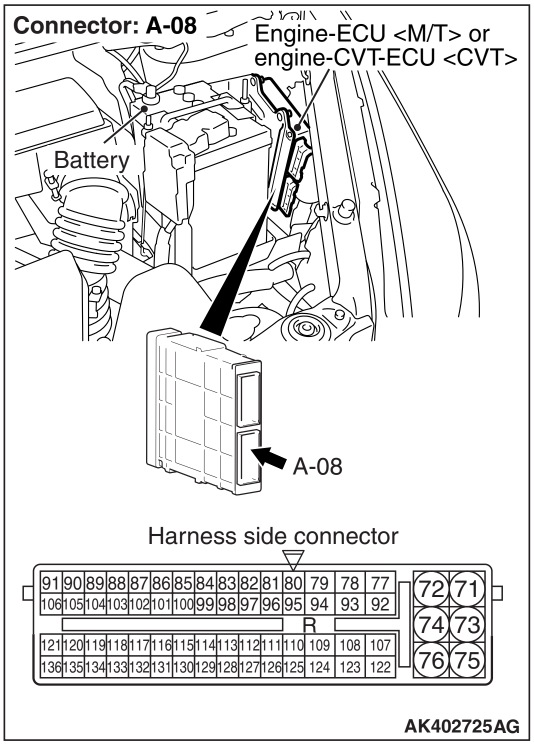
YES : Check and repair harness between B-106 (terminal No. 4) engine control relay connector and B-121 (terminal No. 1) throttle valve control servo relay connector.

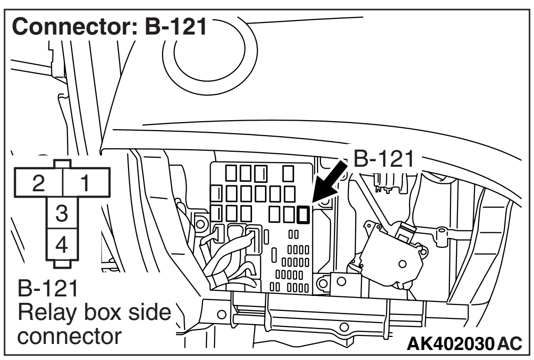
- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

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STEP 6. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.





- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 123 and earth.

OK: System voltage

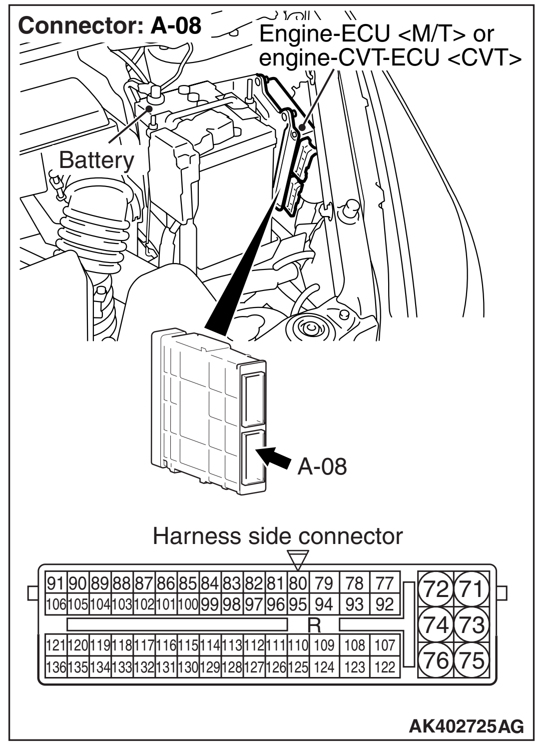
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Check intermediate connector B-110, and repair if necessary. If intermediate connector is normal, check and repair harness between B-121 (terminal No. 2) throttle valve control servo relay connector and A-08 (terminal No. 123) engine-ECU connector or engine-CVT-ECU connector.

- Check earthing line for open/short circuit.

STEP 7. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 78 and earth.

OK: System voltage

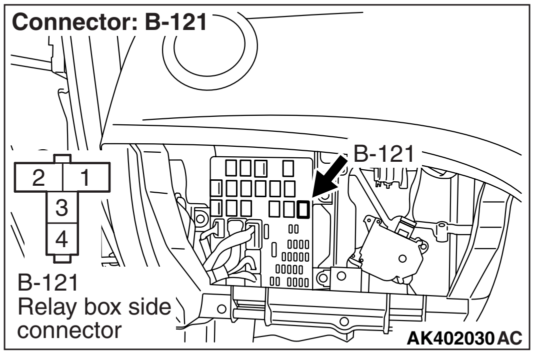
Q: Is the check result normal?

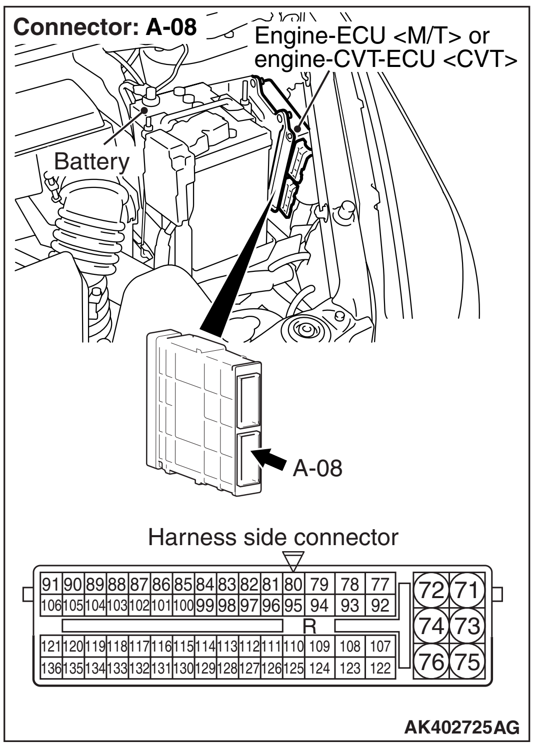
YES : Go to Step 10 .

NO : Go to Step 8 .

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STEP 8. Check harness between B-121 (terminal No. 4) throttle valve control servo relay connector and A-08 (terminal No. 78) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connector B-112, and repair if necessary.

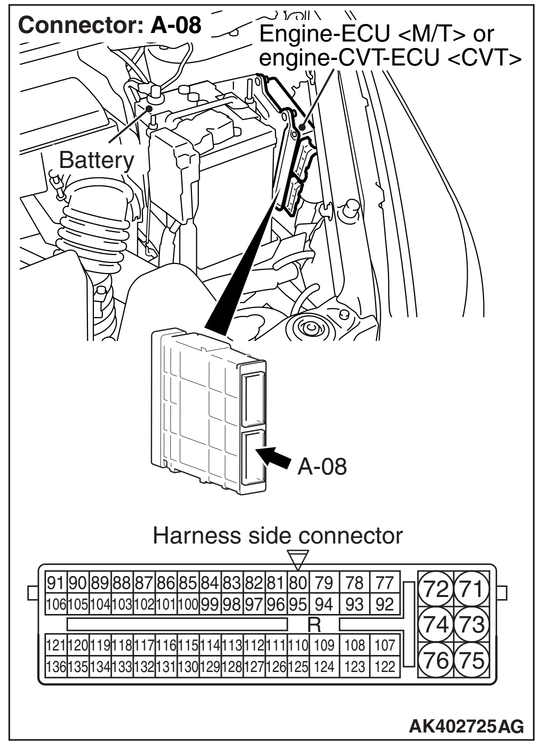
- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector.



- Check output line for damage.

Q: Is the check result normal?

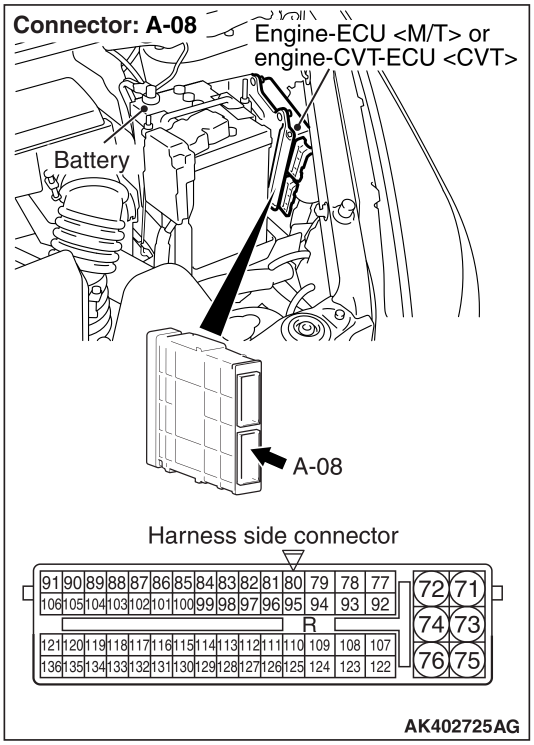
YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

- Check earthing line for open/short circuit.

NO : Repair or replace the connector.

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STEP 10. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

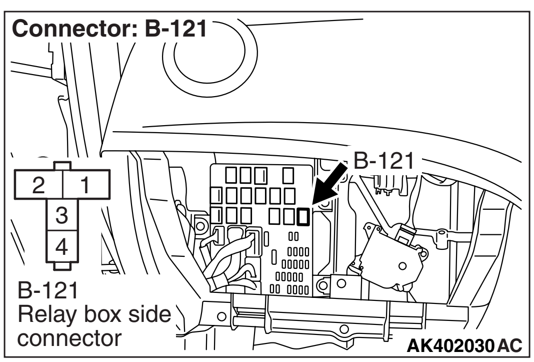


Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair or replace the connector.

STEP 11. Check harness between B-121 (terminal No. 3) throttle valve control servo relay connector and battery.



NOTE: Before checking harness, check intermediate connector B-108, and repair if necessary.

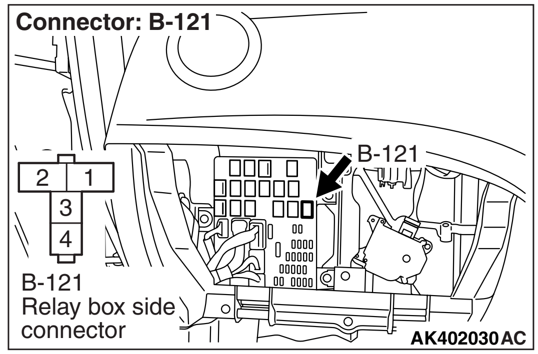
- Check power supply line for damage.

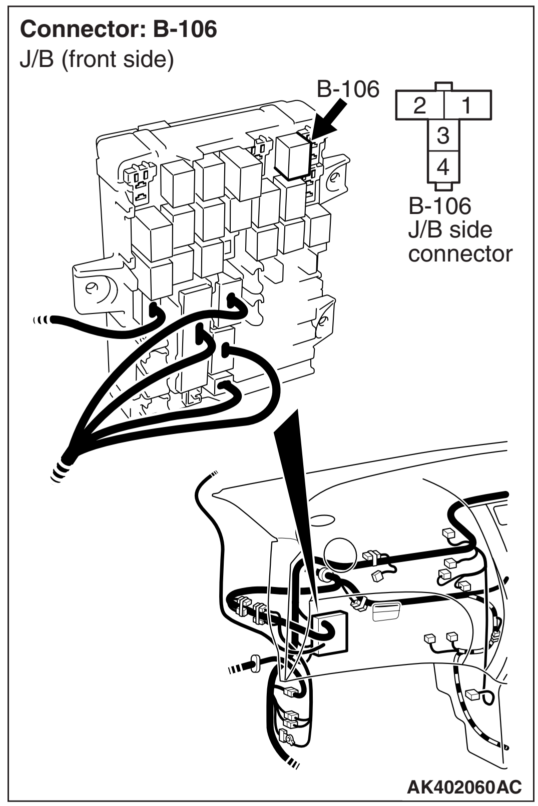
Q: Is the check result?

YES : Go to Step 12 .

NO : Repair the damaged harness wire.

STEP 12. Check harness between B-121 (terminal No. 1) throttle valve control servo relay connector and B-106 (terminal No. 4) engine control relay connector.





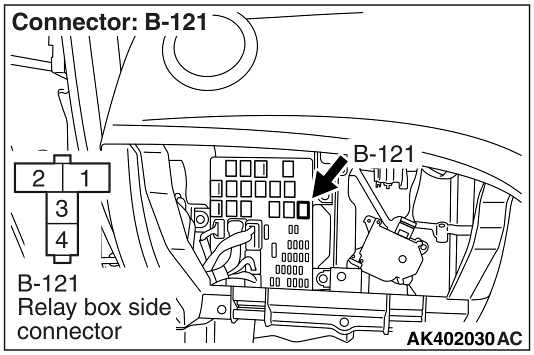
- Check power supply line for damage.

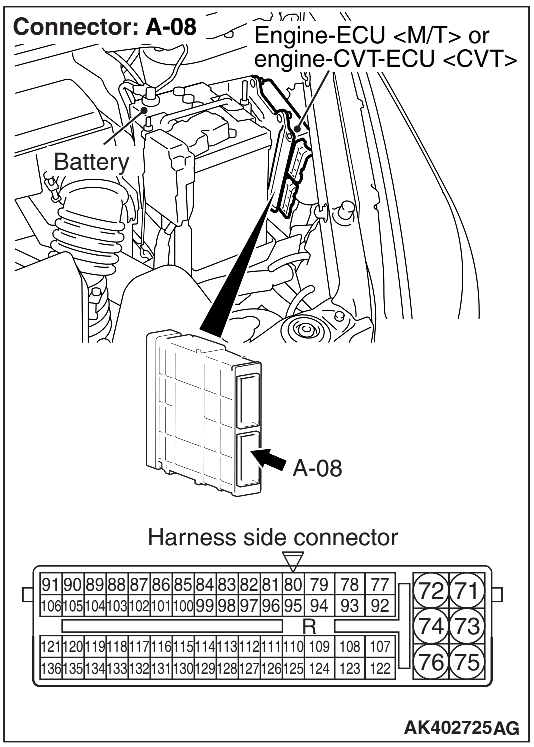
Q: Is the check result?

YES : Go to Step 13 .

NO : Repair the damaged harness wire.

STEP 13. Check harness between B-121 (terminal No. 2) throttle valve control servo relay connector and A-08 (terminal No. 123) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connector B-110, and repair if necessary.

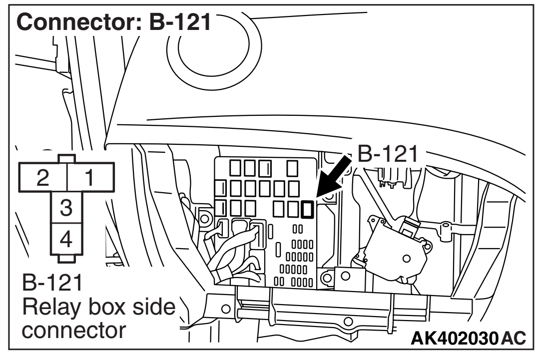
- Check power supply line for damage.

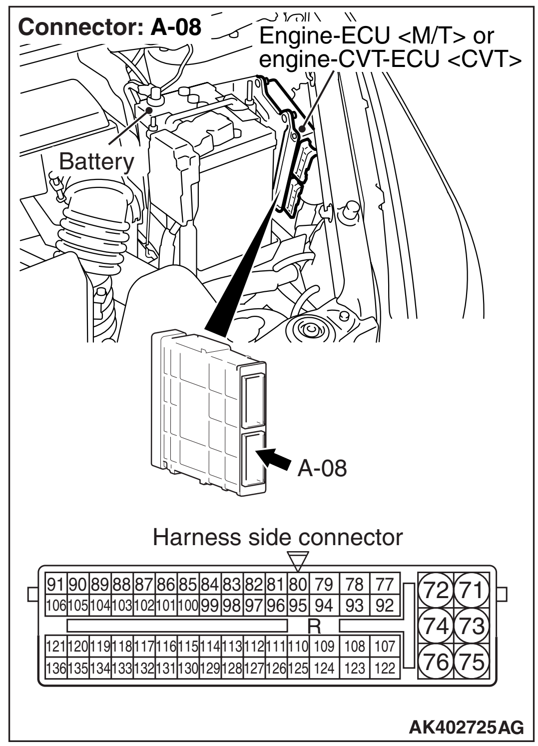
Q: Is the check result?

YES : Go to Step 14 .

NO : Repair the damaged harness wire.

STEP 14. Check harness between B-121 (terminal No. 4) throttle valve control servo relay connector and A-08 (terminal No. 78) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connector B-112, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result?

YES : Go to Step 15 .

NO : Repair the damaged harness wire.

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STEP 15. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

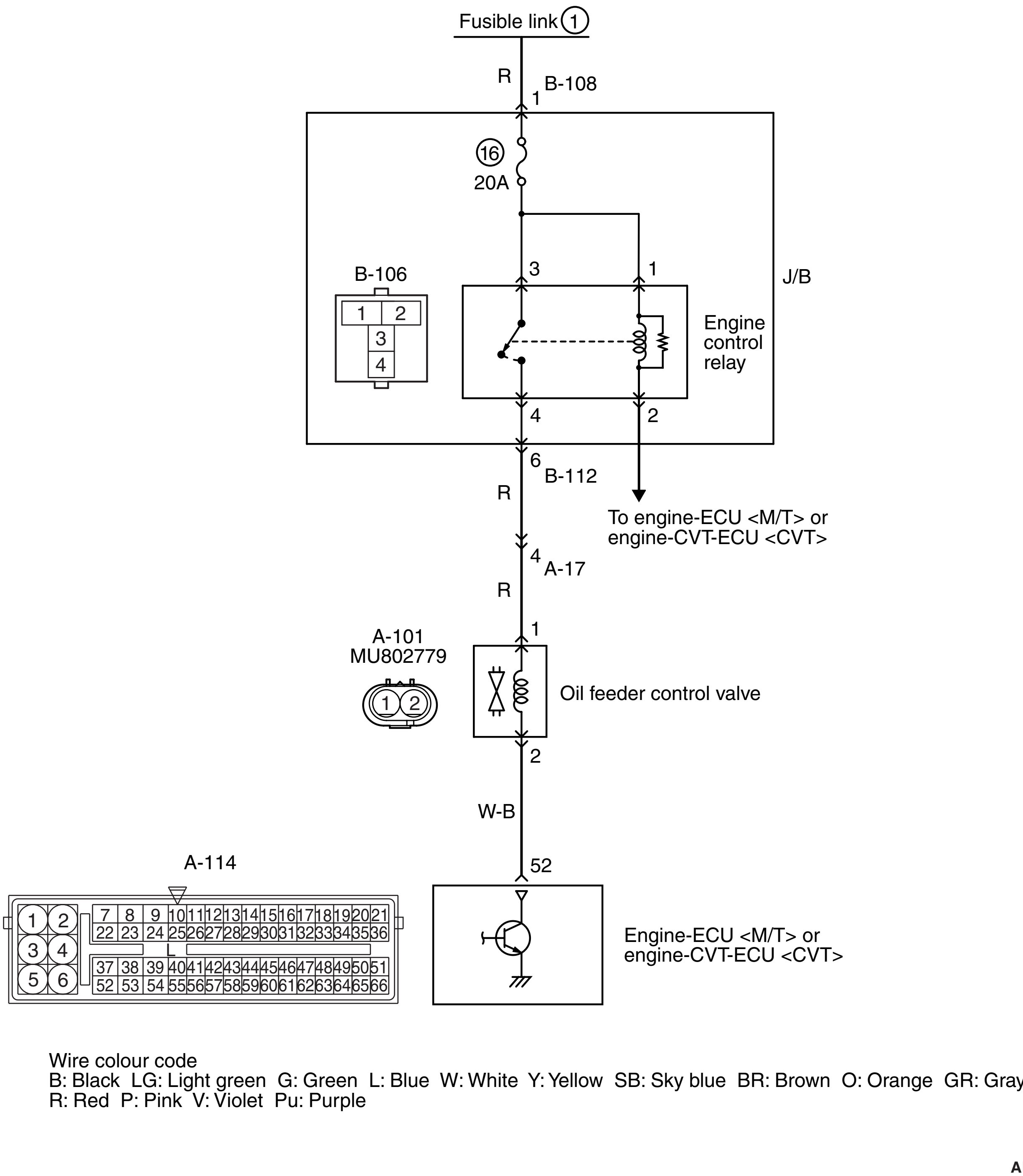
Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Code No. P1021: Oil Feeder Control Valve System

Oil Feeder Control Valve Circuit



OPERATION

- Power is supplied to the oil feeder control valve (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 52) makes the power transistor in the unit be in ON position, and that makes currents go on the oil feeder control valve (terminal No. 2).

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FUNCTION

- The oil feeder control valve controls the phase angle of the intake camshaft through the signal from the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- Oil feeder control valve operation: OFF (Ignition: ON, during the idling and so on)

Judgment Criterion

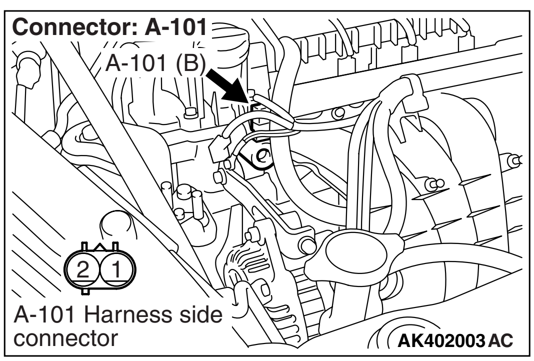
- For 4 seconds or more, the voltage in the drive terminal of the oil feeder control valve on the engine-ECU <M/T> or engine-CVT-ECU <CVT> is abnormal.

PROBABLE CAUSES

- Failed purge oil feeder control valve
- Open/short circuit in oil feeder control valve circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-101 oil feeder control valve connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Check oil feeder control valve.

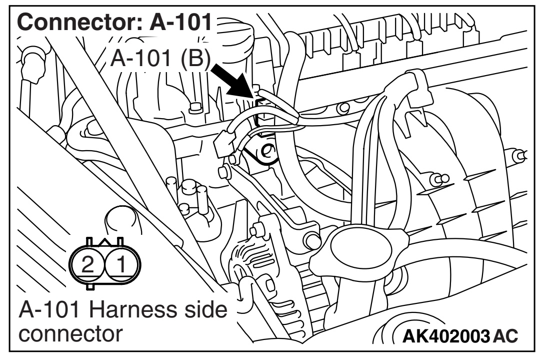
- Check oil feeder control valve (Refer to P.13A-365).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace oil control valve.

STEP 3. Perform voltage measurement at A-101 oil feeder control valve connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

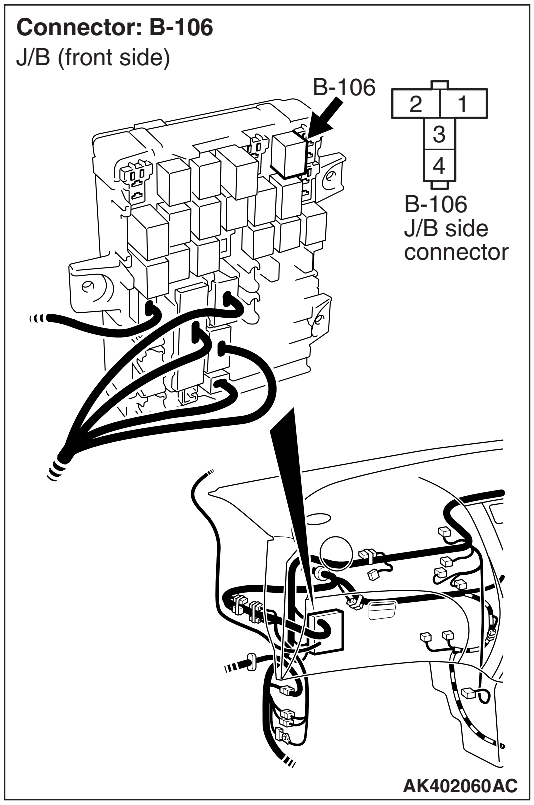
Q: Is the check result normal?

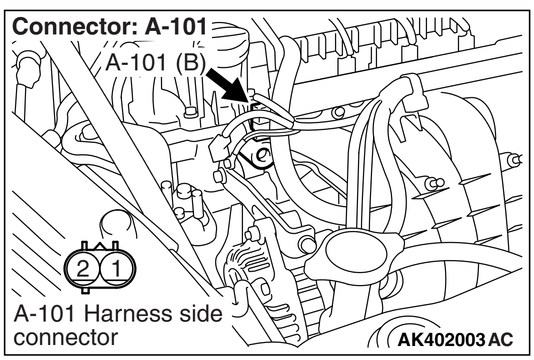
YES : Go to Step 5 .

NO : Go to Step 4 .

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STEP 4. Connector check: B-106 engine control relay connector





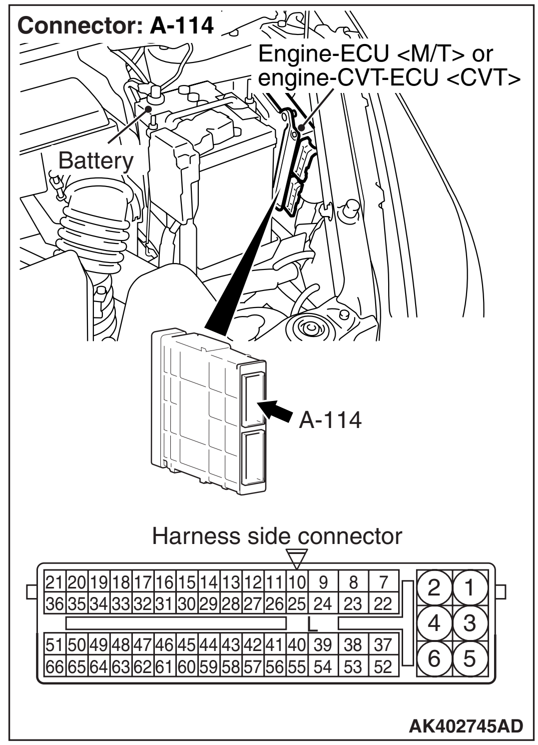
Q: Is the check result normal?

YES : Check intermediate connector A-17 and B-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-101 (terminal No. 1) oil feeder control valve connector and B-106 (terminal No. 4) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 52 and earth.

OK: System voltage

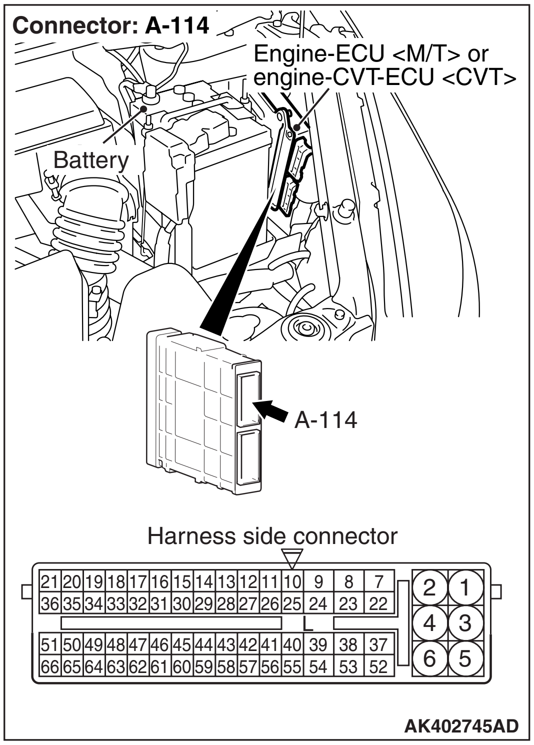
Q: Is the check result normal?

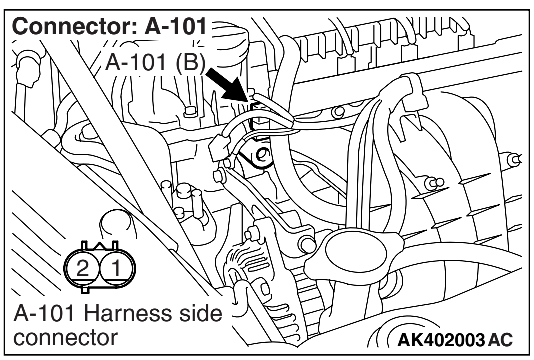
YES : Go to Step 7 .

NO : Go to Step 6 .

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STEP 6. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





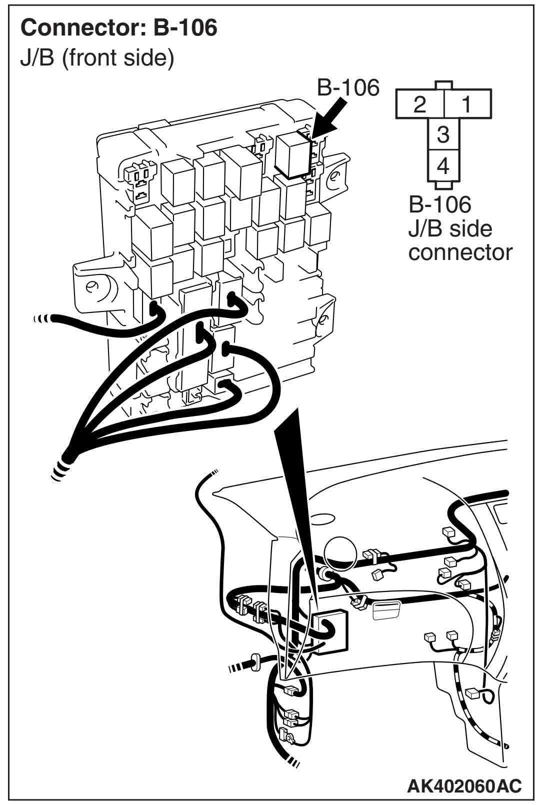
Q: Is the check result normal?

YES : Check and repair harness between A-101 (terminal No. 2) oil feeder control valve connector and A-114 (terminal No. 52) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for open/short circuit.

NO : Repair or replace the connector.

STEP 7. Connector check: B-106 engine control relay connector



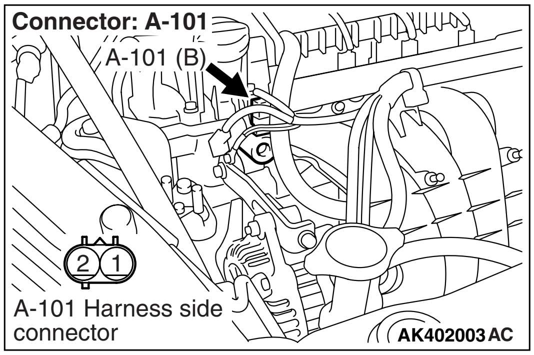
Q: Is the check result normal?

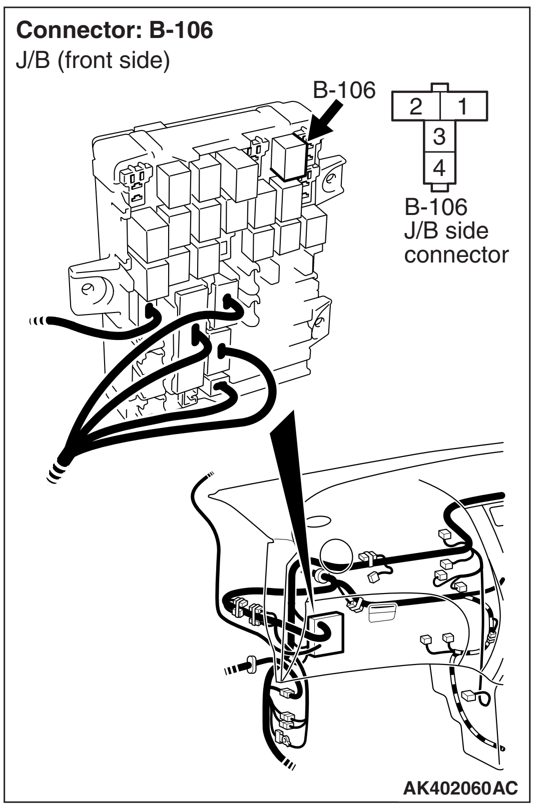
YES : Go to Step 8 .

NO : Repair or replace the connector.

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STEP 8. Check harness between A-101 (terminal No. 1) oil feeder control valve connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connectors A-17 and B-112, and repair if necessary.

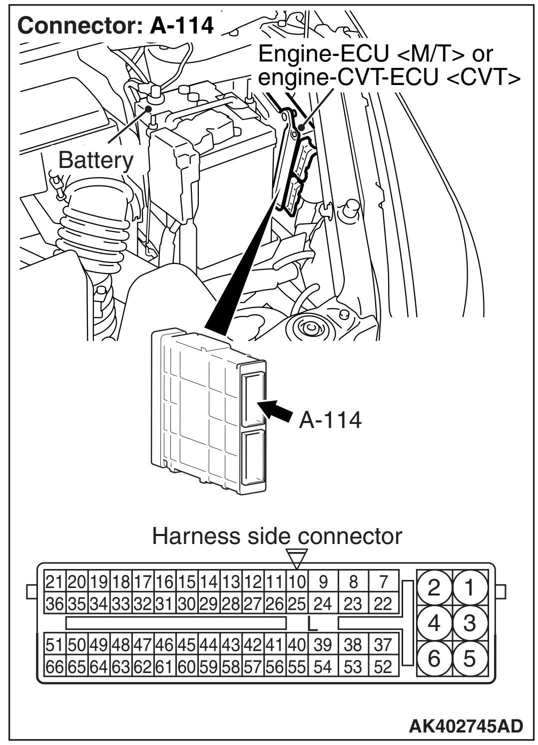
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



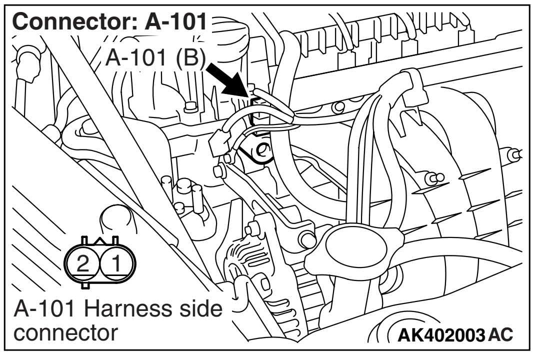
Q: Is the check result normal?

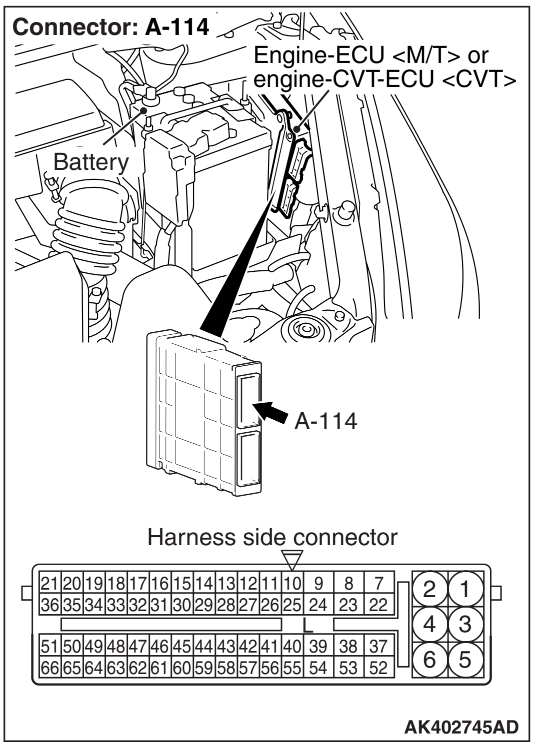
YES : Go to Step 10 .

NO : Repair or replace the connector.

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STEP 10. Check harness between A-101 (terminal No. 2) oil feeder control valve connector and A-114 (terminal No. 52) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair the damaged harness wire.

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P1602: Communication Malfunction (between Engine-ECU <M/T> or Engine-CVT-ECU <CVT> Main Processor and System LSI)

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks the communication status for abnormal conditions.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is "ON" position.

Judgement Criteria

- At abnormal communication with the system LSI <M/T>.
- The engine-CVT-ECU detects an error in communication with the throttle actuator control module for 0.07 second <CVT>.

PROBABLE CAUSE

- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. Check the trouble symptoms.

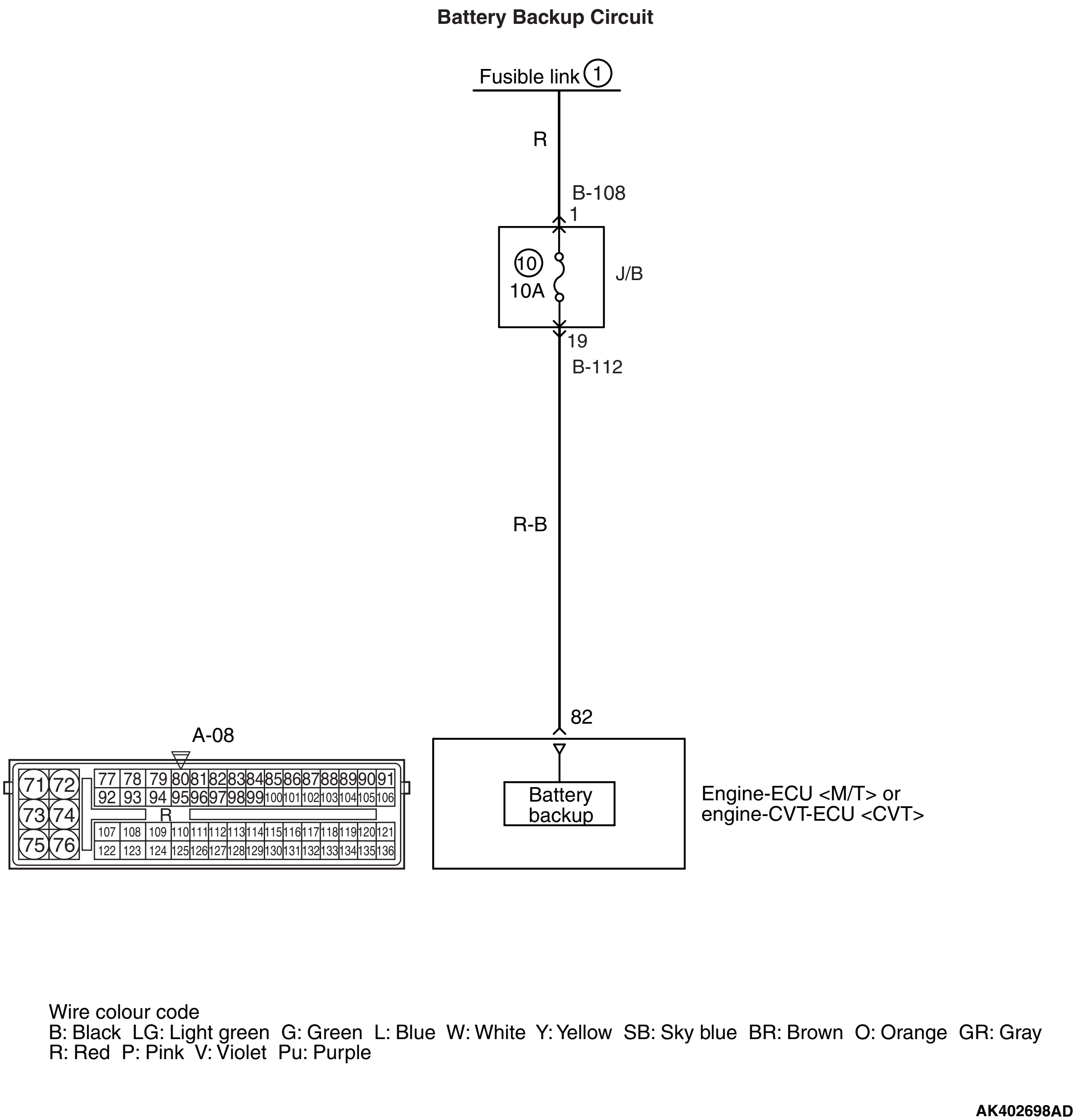
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P1603: Battery Backup Circuit Malfunction



OPERATION

- Power is directly supplied to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 82) from the battery.

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> is check the open circuit of battery backup line.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- After engine starting sequence is completed <CVT>.

Judgment Criteria

- Battery backup line voltage is 6 V or lower for 2 seconds <M/T>.
- Battery backup line voltage is 10 V or lower for 2 seconds <CVT>.

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PROBABLE CAUSES

- Open/short circuit in battery backup line circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

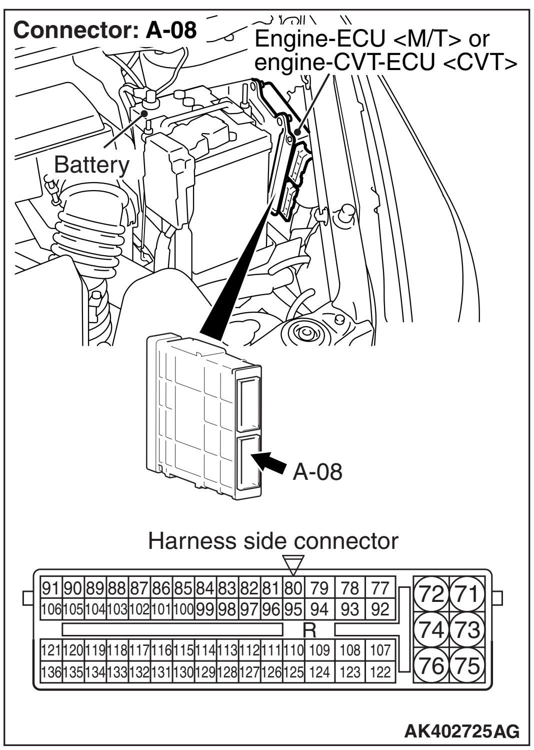
- Temporarily place the ignition switch in "LOCK" (OFF) position, and 10 seconds after that, place it in "ON" position again.

Q: Is the diagnosis code P1603 set?

YES : Go to Step 2 .

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 2. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 82 and earth.

OK: System voltage

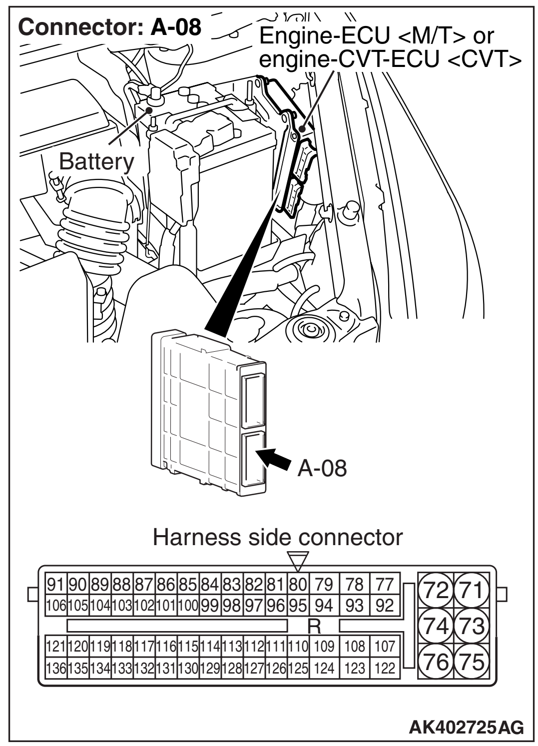
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check intermediate connector B-112 and B-108, and repair if necessary. If intermediate connector is normal, check and repair harness between battery and A-08 (terminal No. 82) engine-ECU connector or engine-CVT-ECU connector.

- Check power supply line for open/short circuit.

STEP 3. Check harness between battery and A-08 (terminal No. 82) engine-ECU connector or engine-CVT-ECU connector.



NOTE: Before checking harness, check intermediate connector B-108 and B-112, and repair if necessary.

- Check power supply line for damage.

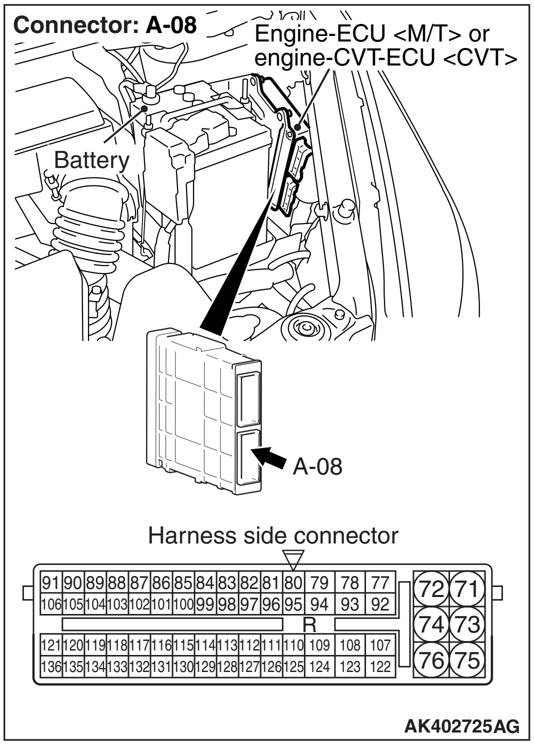
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair the damaged harness wire.

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STEP 4. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5. M.U.T.-III diagnosis code.

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Code No. P2100: Throttle Valve Control Servo Circuit (open)

OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminals No. 7, No. 22) to the electronically controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- Throttle valve control servo supply voltage is 6.0 V or more <M/T>.
- Battery positive voltage is more than 8.3 V.

Judgement Criteria

- There is deviation between throttle valve actual opening angle and target opening angle <M/T>.
- Throttle valve control servo current is 0.1 A or less for 0.72 second <CVT>.

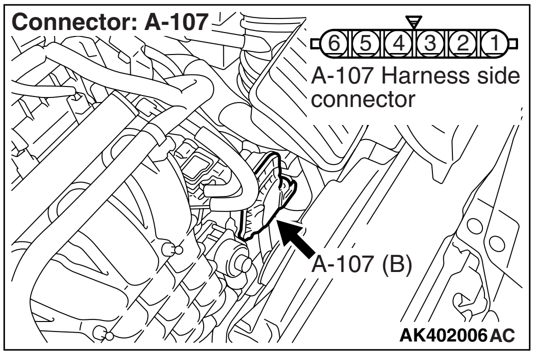
PROBABLE CAUSES

- Failed throttle valve control servo
- Open/short circuit in throttle valve control servo circuit or lose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

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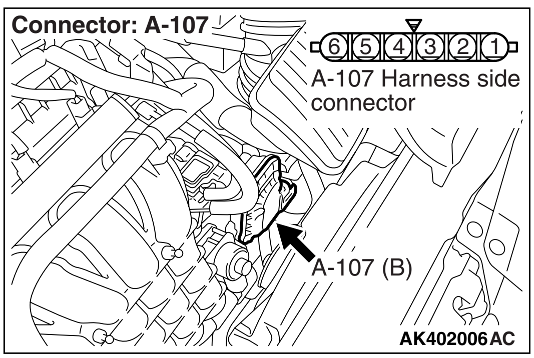
DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-107 electronic-controlled throttle valve connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

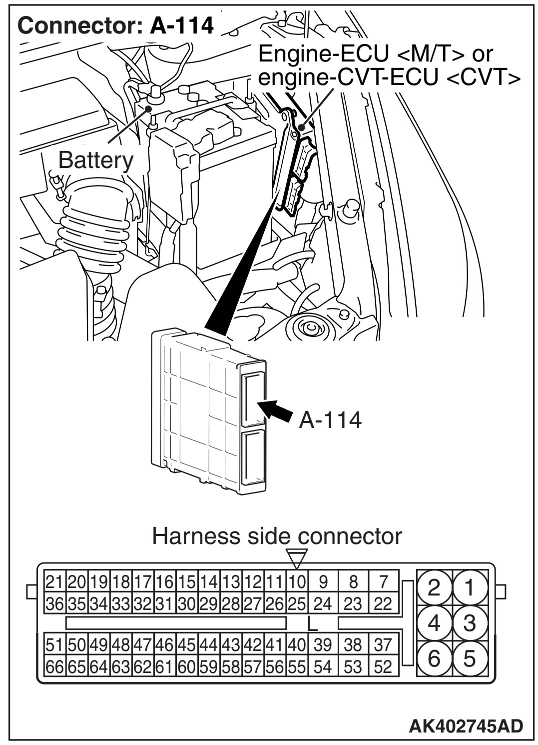
STEP 2. Check throttle valve control servo itself.



- Check throttle valve control servo itself (Refer to P.13A-366).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace throttle body assembly.

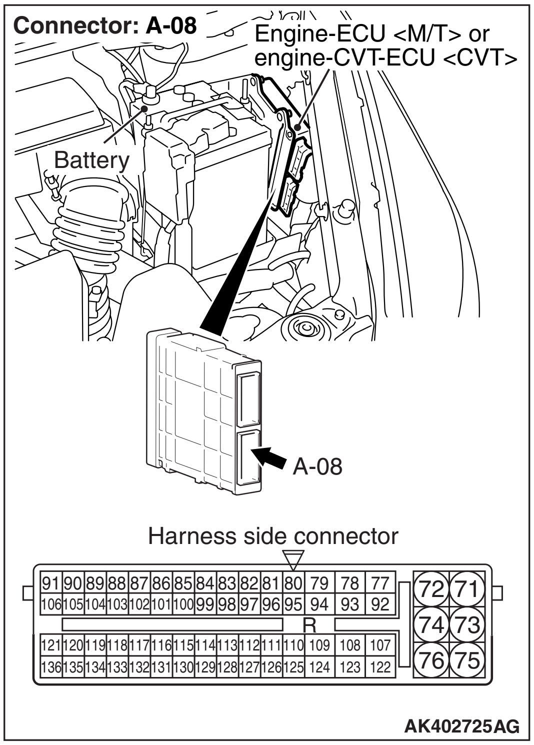
STEP 3. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



Q: Is the check result normal?
YES : Go to Step 4 .
NO : Repair or replace the connector.

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STEP 4. Perform resistance measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect connector and measure at harness side.
- Resistance between terminal No. 93 and earth or terminal No. 108 and earth.

OK: Continuity (2 Ω or less)

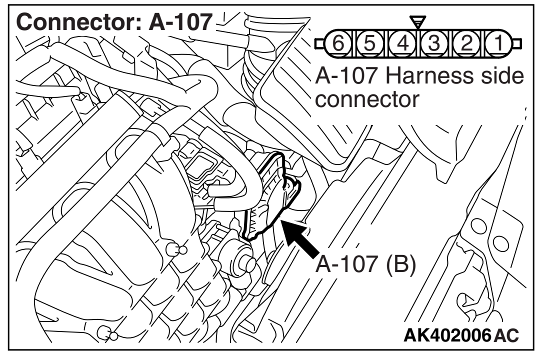
Q: Is the check result normal?

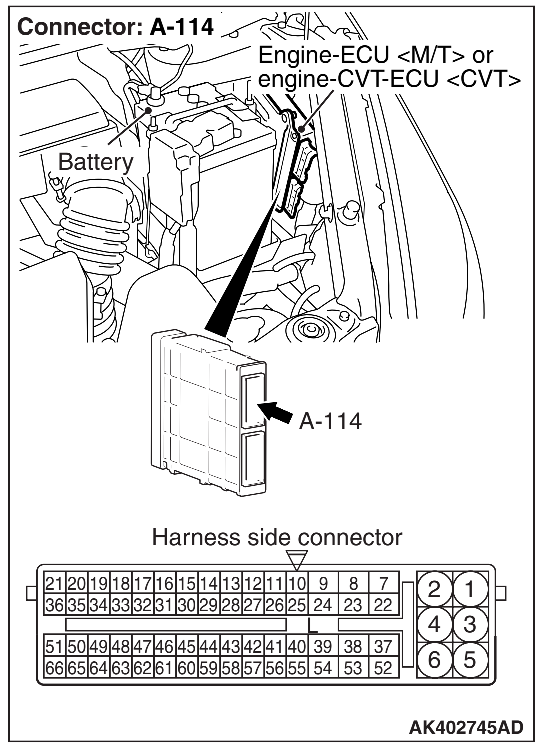
YES : Go to Step 5 .

NO : Check repair harness between A-08 (terminal No. 93 or No. 108) engine-ECU connector or engine-CVT-ECU connector and A-30 (terminal No. 3 or No. 6) earth connector.

- Check earthing line for open circuit and damage.

STEP 5. Check harness between A-107 (terminal No. 1) electronic-controlled throttle valve connector and A-114 (terminal No. 7) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit and damage.

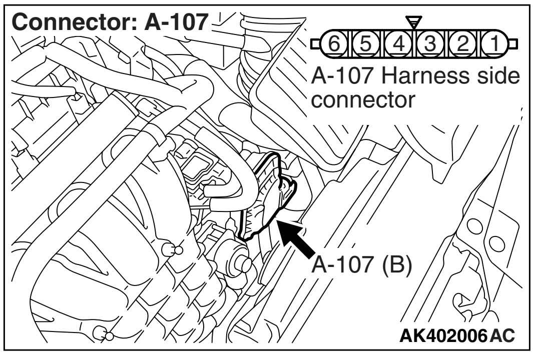
Q: Is the check result normal?

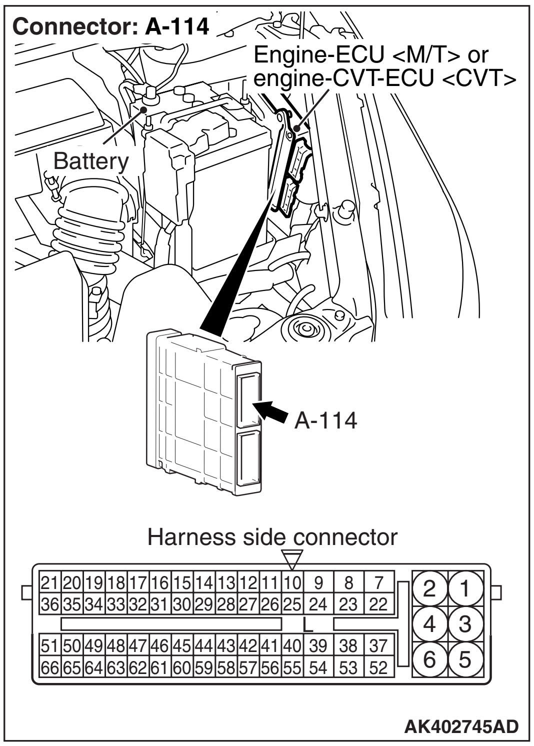
YES : Go to Step 6 .

NO : Repair the damaged harness wire.

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STEP 6. Check harness between A-107 (terminal No. 2) electronic-controlled throttle valve connector and A-114 (terminal No. 22) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit and damage.

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Repair the damaged harness wire.

STEP 7. Check the trouble symptoms.

Q: Is the check result normal?
YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P2101: Throttle Valve Control Servo Magneto Malfunction

OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminals No. 7, No. 22) to the electronically controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> check whether the throttle valve control servo magneto failed.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- Battery positive voltage is more than 8.3 V.

Judgement Criteria

- Driving current of throttle valve control servo is abnormal <M/T>.

or

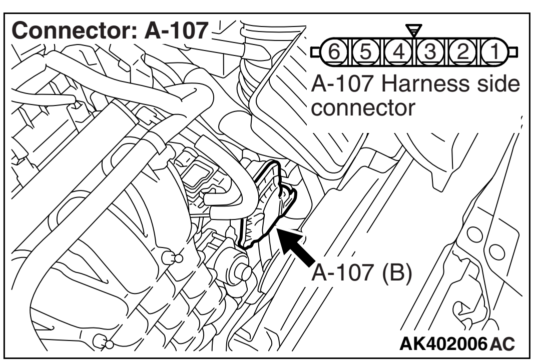
- Temperature in driving circuit of throttle valve control servo is abnormal <M/T>.
- The coil temperature of the throttle valve control servo is 180°C or higher for 0.8 second <CVT>.

PROBABLE CAUSES

- Failed throttle valve control servo
- Open/short circuit in throttle valve control servo circuit or lose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

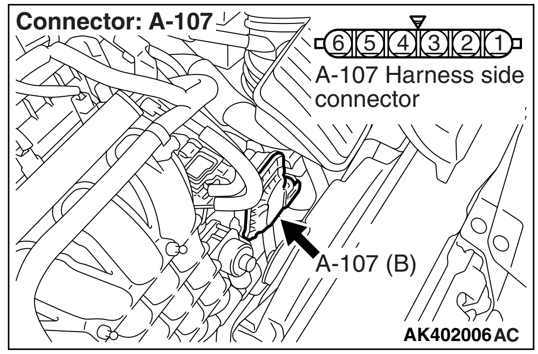
DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-107 electronic-controlled throttle valve connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

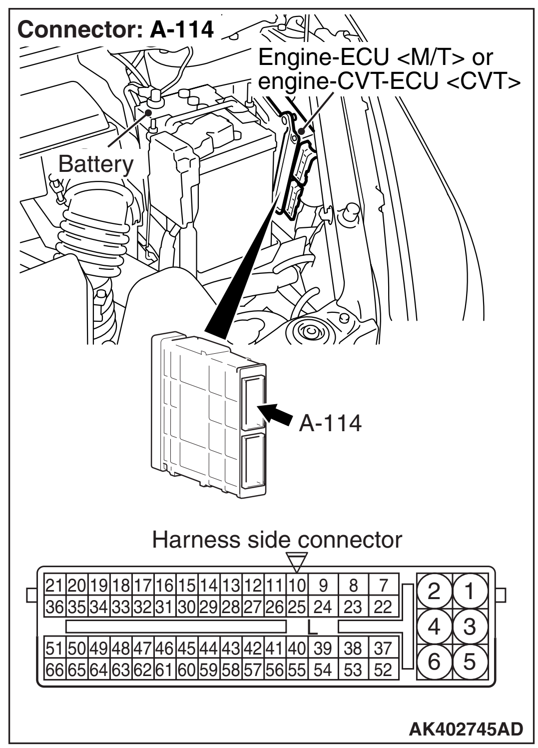
STEP 2. Check throttle valve control servo itself.



- Check throttle valve control servo itself (Refer to P.13A-366).

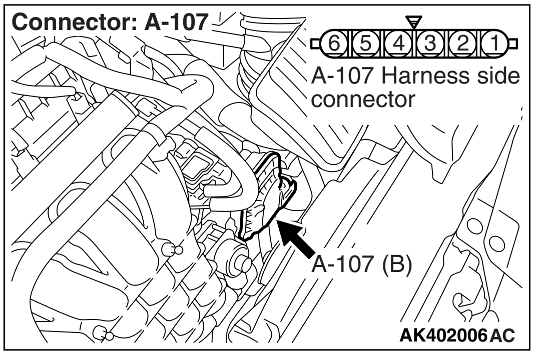
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace throttle body assembly.

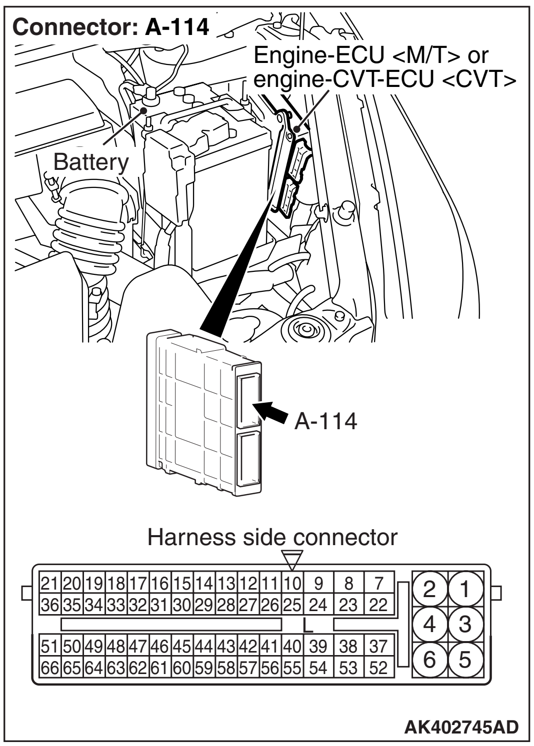
STEP 3. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



Q: Is the check result normal?
YES : Go to Step 4 .
NO : Repair or replace the connector.

STEP 4. Check harness between A-107 (terminal No. 1) electronic-controlled throttle valve connector and A-114 (terminal No. 7) engine-ECU connector or engine-CVT-ECU connector.





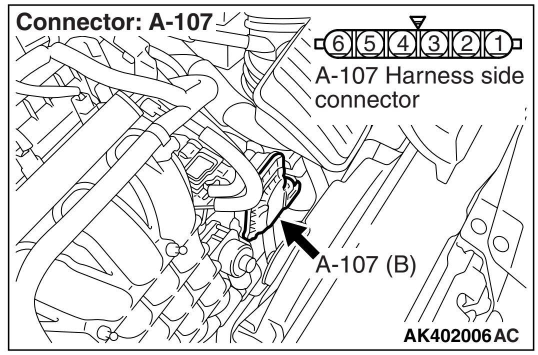
- Check output line for short circuit and damage.

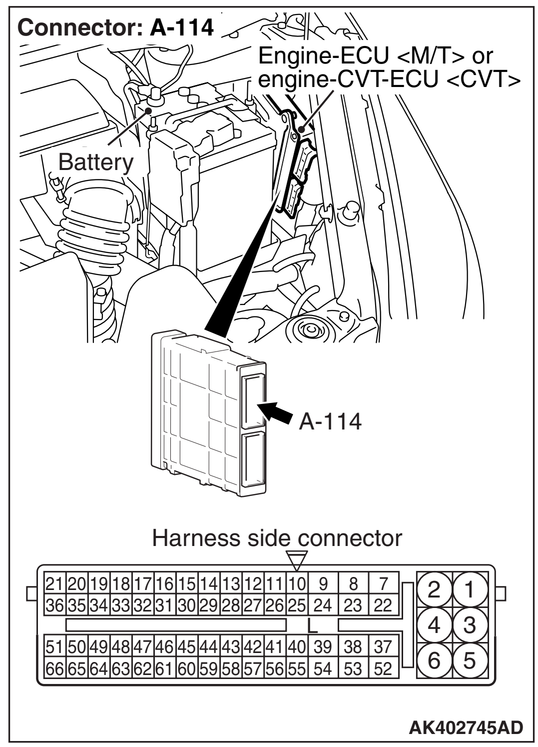
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair the damaged harness wire.

STEP 5. Check harness between A-107 (terminal No. 2) electronic-controlled throttle valve connector and A-114 (terminal No. 22) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. Check the trouble symptoms.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P2108: Throttle Valve Control Servo Processor Malfunction

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks the throttle valve control servo processor for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 V.
- The power supply voltage of the throttle valve control servo is more than 6 V <CVT>.

Judgement Criterion

- Malfunction of the throttle position sensor (main) input interface.

PROBABLE CAUSE

- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

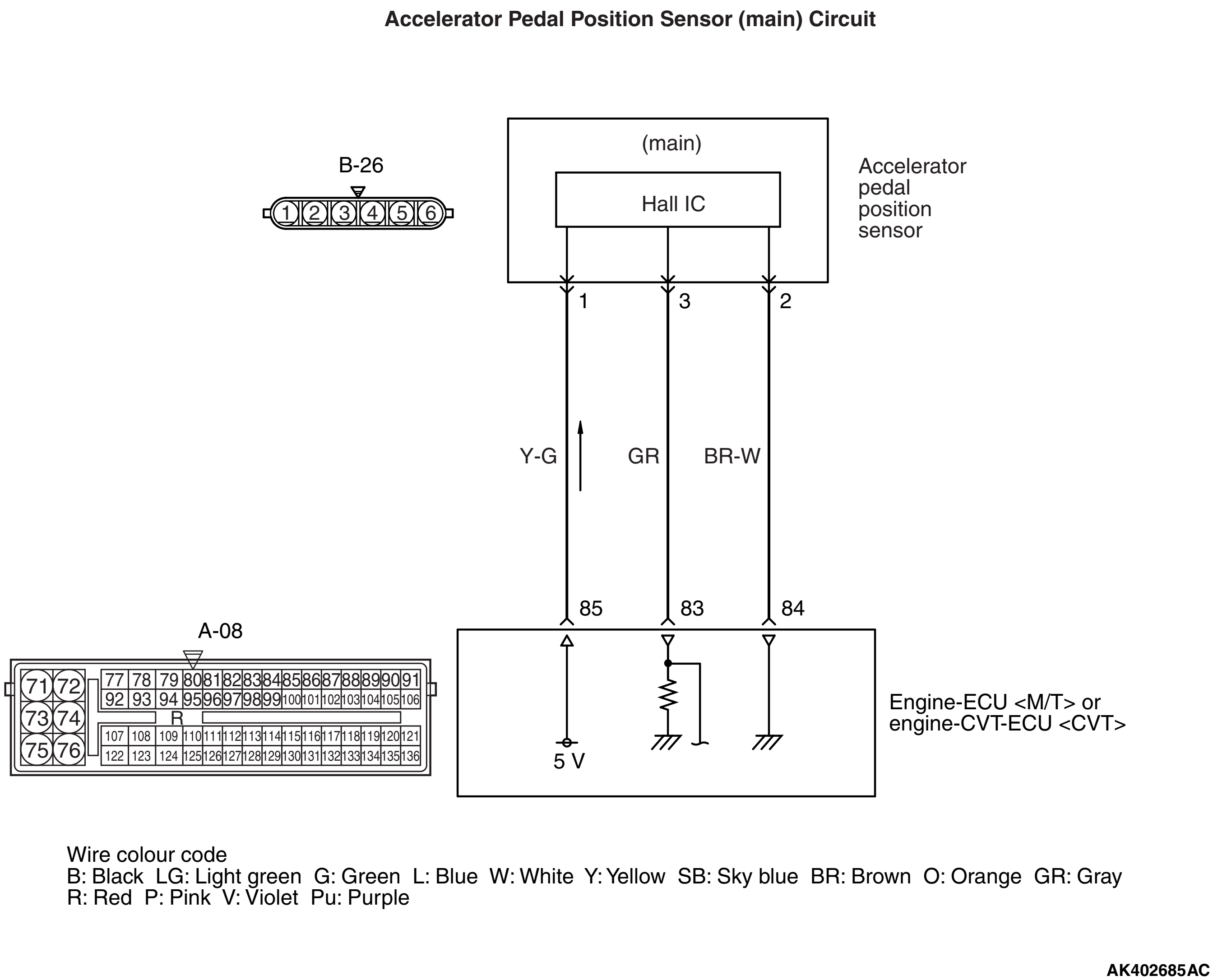
STEP 1. M.U.T.-III diagnosis code.

Q: Is any other diagnosis code than P2108 output?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

Code No. P2122: Accelerator Pedal Position Sensor (Main) Circuit Low Input



OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 1) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 85).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 84) from the accelerator pedal position sensor (terminal No. 2).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 83) from the accelerator pedal position sensor output terminal (terminal No. 3).

FUNCTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Accelerator pedal position sensor (main) output voltage is 0.2 V or less <M/T>.
- Accelerator pedal position sensor (main) output voltage is 0.2 V or less for 1.0 second <CVT>.

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PROBABLE CAUSES

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

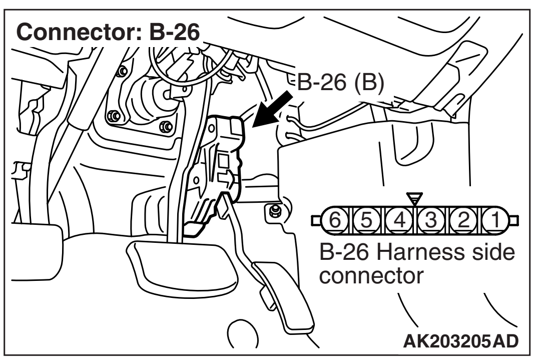
- Refer to Data List Reference Table P.13A-331.
  a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-26 accelerator pedal position sensor connector

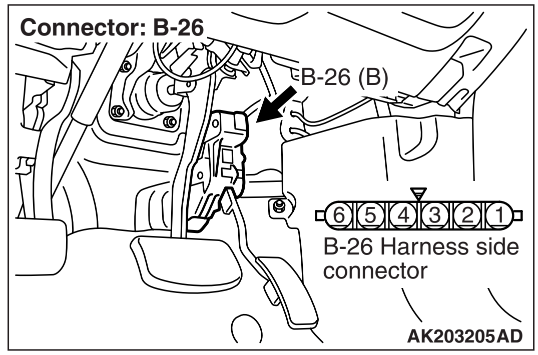


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at B-26 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

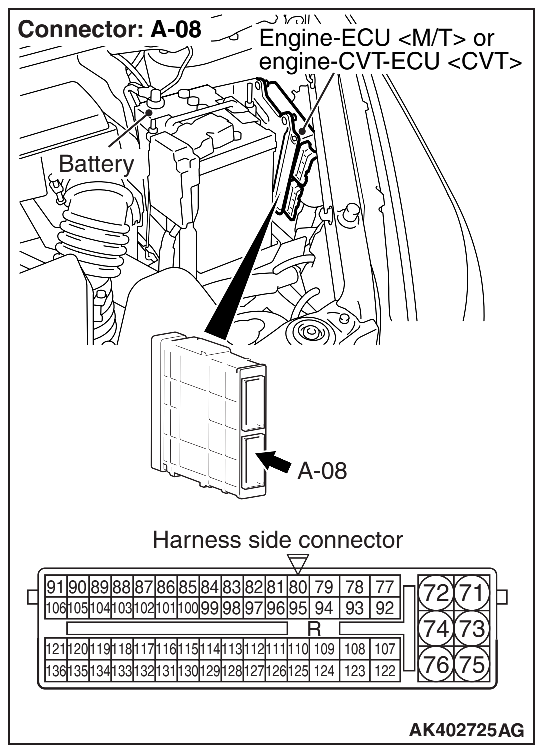
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

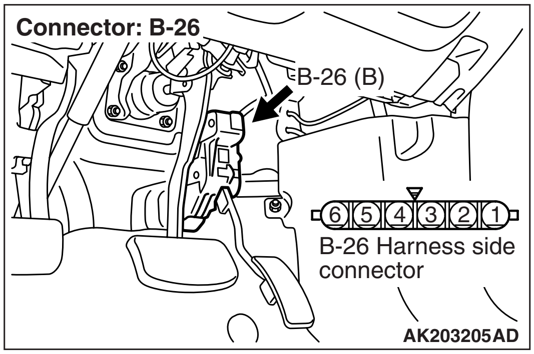


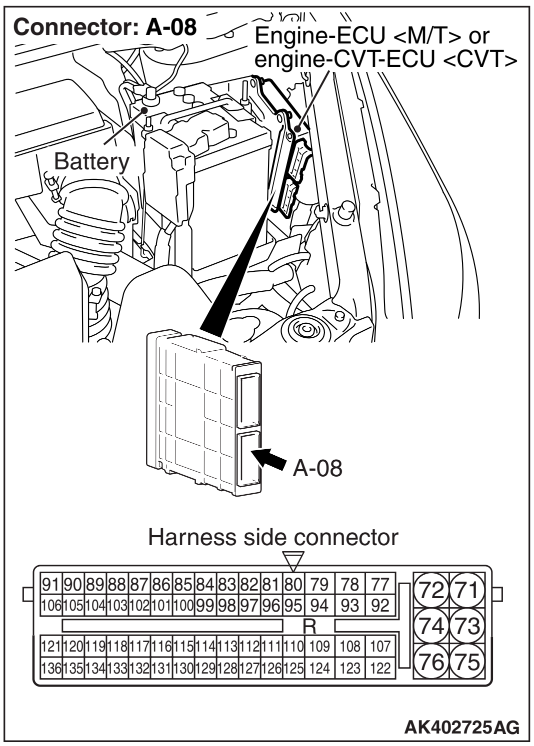
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace the connector.

STEP 5. Check harness between B-26 (terminal No. 1) accelerator pedal position sensor connector and A-08 (terminal No. 85) engine-ECU connector or engine-CVT-ECU connector.





- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

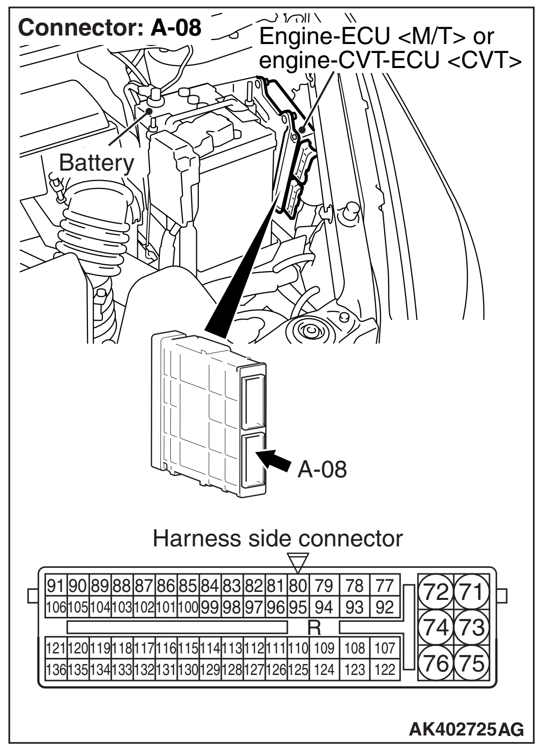
- Refer to Data List Reference Table P.13A-331.
  a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



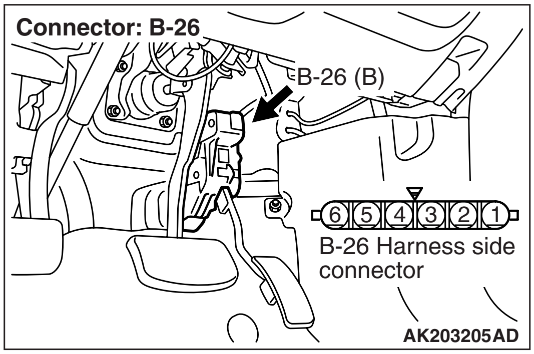
Q: Is the check result normal?

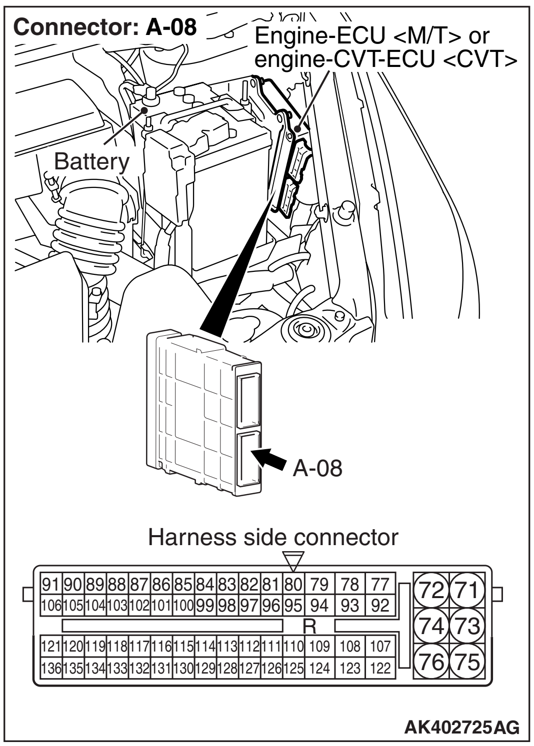
YES : Go to Step 8 .

NO : Repair or replace the connector.

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STEP 8. Check harness between B-26 (terminal No. 1) accelerator pedal position sensor connector and A-08 (terminal No. 85) engine-ECU connector or engine-CVT-ECU connector.





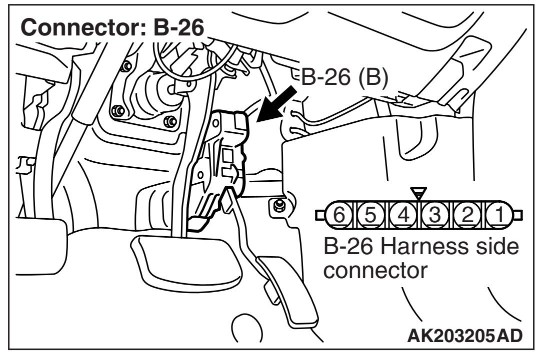
- Check power supply line for damage.

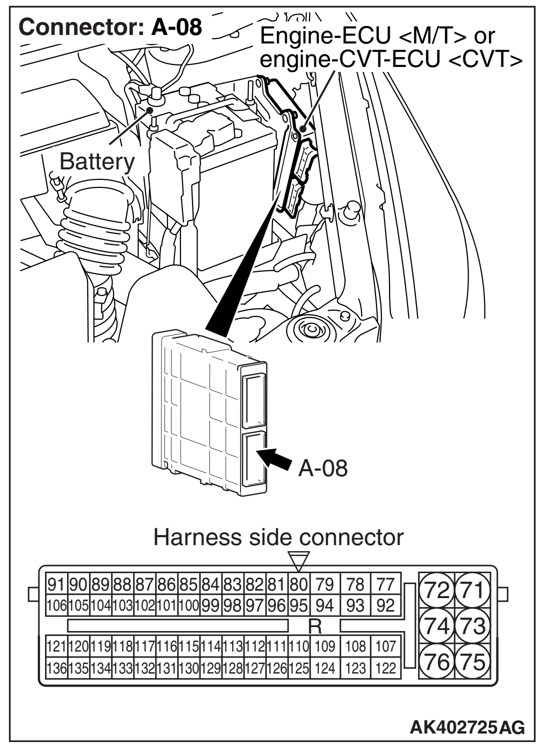
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Check harness between B-26 (terminal No. 3) accelerator pedal position sensor connector and A-08 (terminal No. 83) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

STEP 10. Replace the accelerator pedal assembly.

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?

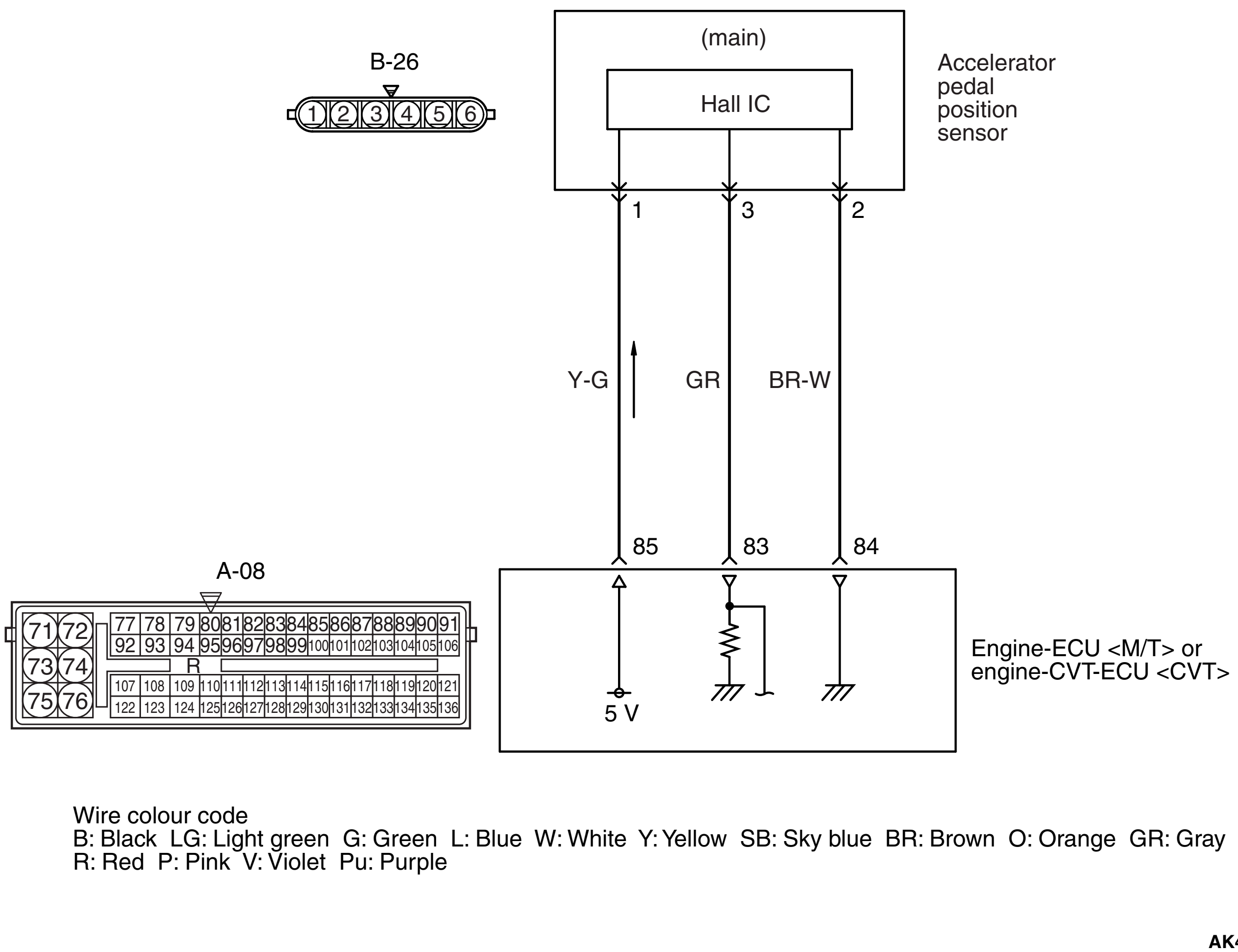
YES : Check end.

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Group TOC

Code No. P2123: Accelerator Pedal Position Sensor (Main) Circuit High Input

Accelerator Pedal Position Sensor (main) Circuit



OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 1) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 85).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 84) from the accelerator pedal position sensor (terminal No. 2).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 83) from the accelerator pedal position sensor output terminal (terminal No. 3).

FUNCTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Accelerator pedal position sensor (main) output voltage is 4.8 V or more <M/T>.
- Accelerator pedal position sensor (main) output voltage is 4.5 V or more for is 1 second <CVT>.
- Accelerator pedal position sensor (sub) output voltage is 0.2 – 2.5 V <CVT>.

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PROBABLE CAUSES

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

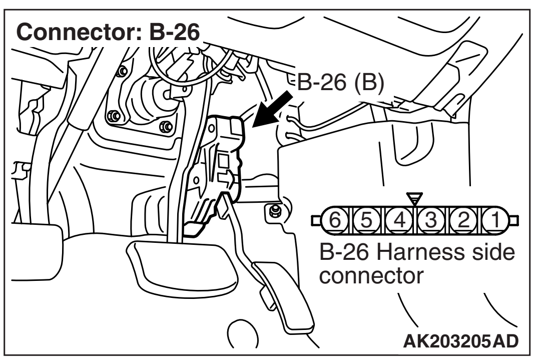
- Refer to Data List Reference Table P.13A-331.
  a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-26 accelerator pedal position sensor connector

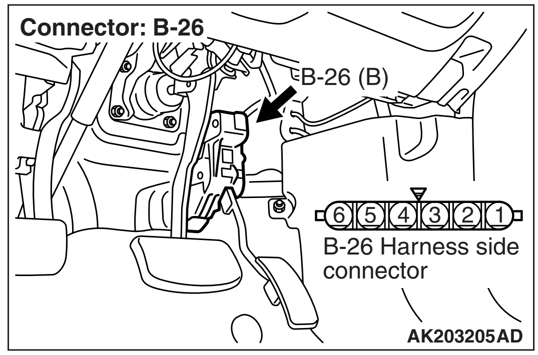


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at B-26 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

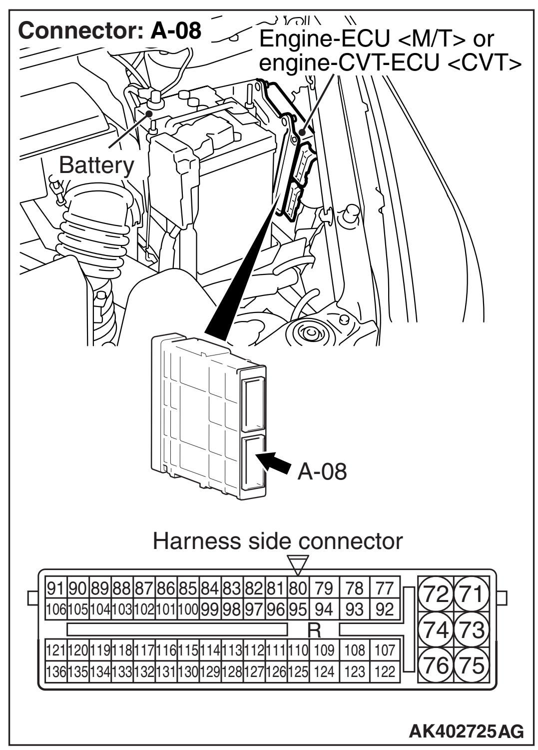
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



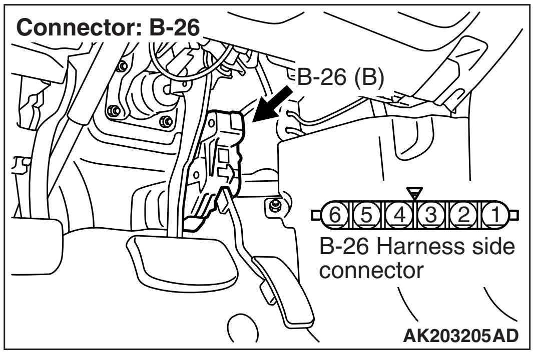
Q: Is the check result normal?

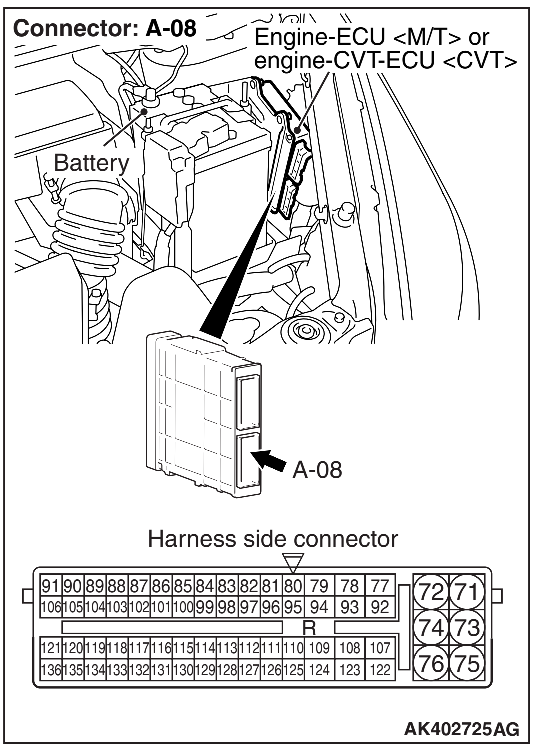
YES : Go to Step 5 .

NO : Repair or replace the connector.

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STEP 5. Check harness between B-26 (terminal No. 2) accelerator pedal position sensor connector and A-08 (terminal No. 84) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Replace the accelerator pedal assembly.

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?

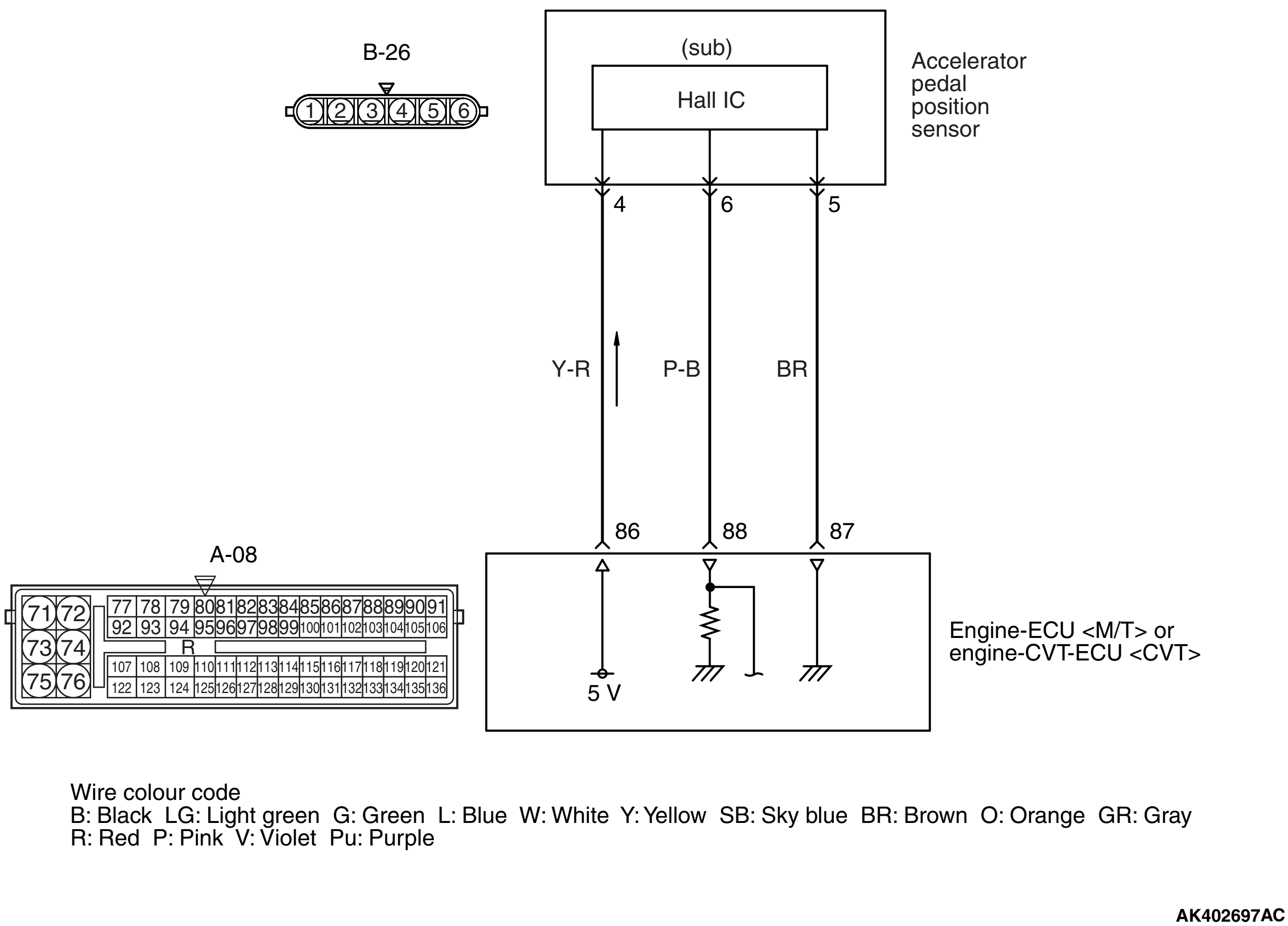
YES : Check end.

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P2127: Accelerator Pedal Position Sensor (Sub) Circuit Low Input

Accelerator Pedal Position Sensor (sub) Circuit



OPERATION

- A power voltage of 2.5 V is applied to the accelerator pedal position sensor (terminal No. 4) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 86).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 87) from the accelerator pedal position sensor (terminal No. 5).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 88) from the accelerator pedal position sensor output terminal (terminal No. 6).

FUNCTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position

Judgment Criteria

- Accelerator pedal position sensor (sub) output voltage is 0.2 V or less <M/T>.
- Accelerator pedal position sensor (sub) output voltage is 0.2 V or less for 1 second <CVT>.

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PROBABLE CAUSES

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

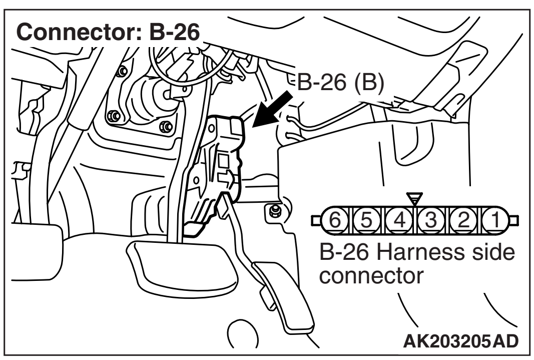
- Refer to Data List Reference Table P.13A-331.
  a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-26 accelerator pedal position sensor connector

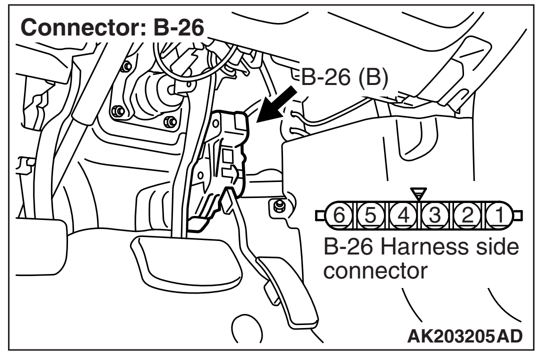


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at B-26 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

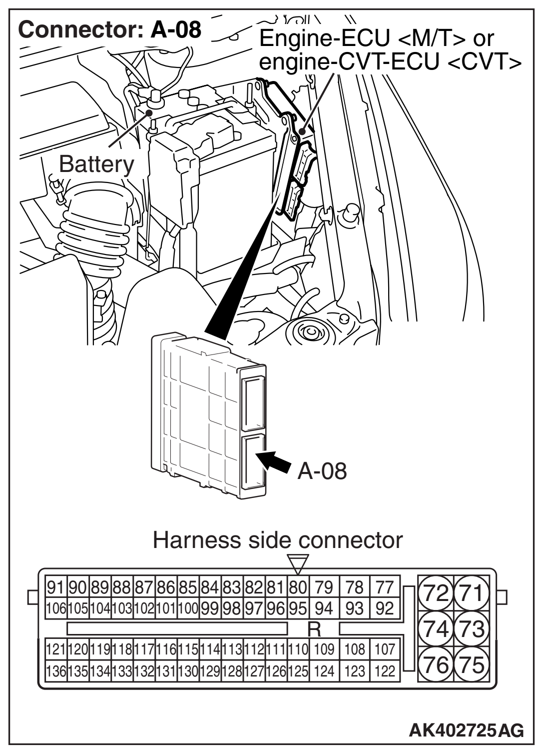
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



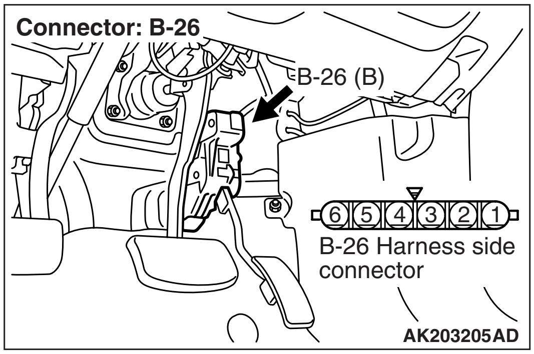
Q: Is the check result normal?

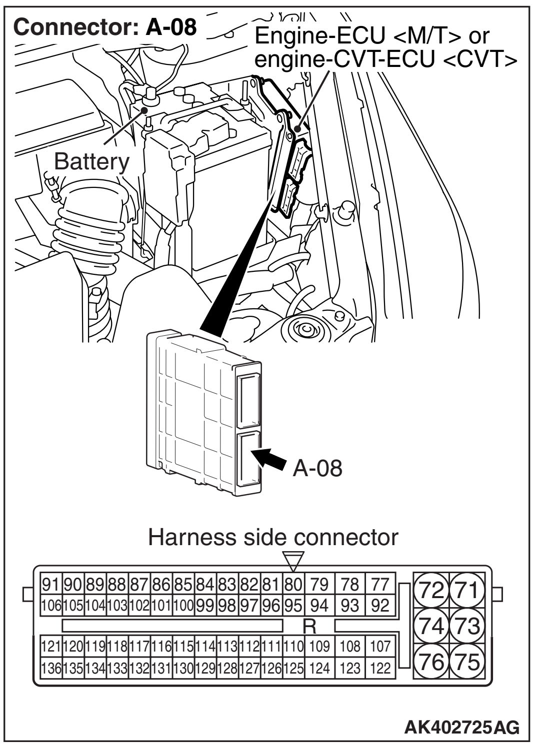
YES : Go to Step 5 .

NO : Repair or replace the connector.

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STEP 5. Check harness between B-26 (terminal No. 4) accelerator pedal position sensor connector and A-08 (terminal No. 86) engine-ECU connector or engine-CVT-ECU connector.





- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

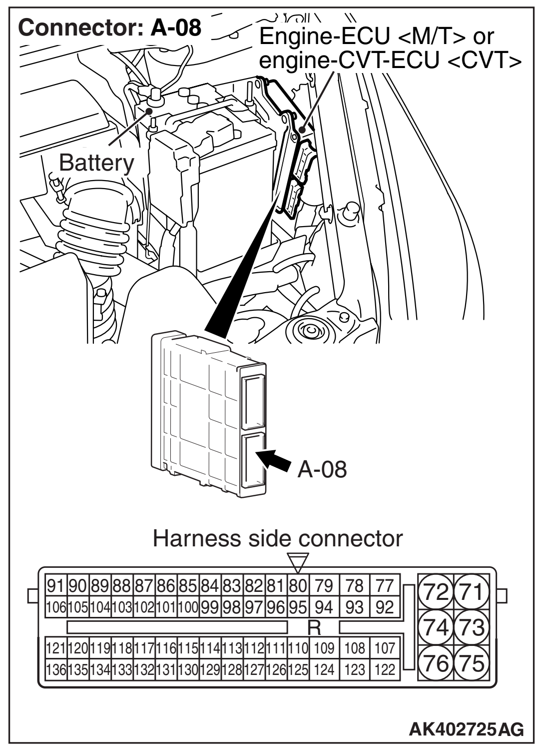
- Refer to Data List Reference Table P.13A-331.
  a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

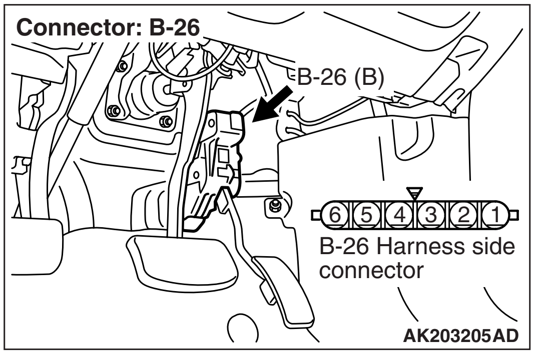


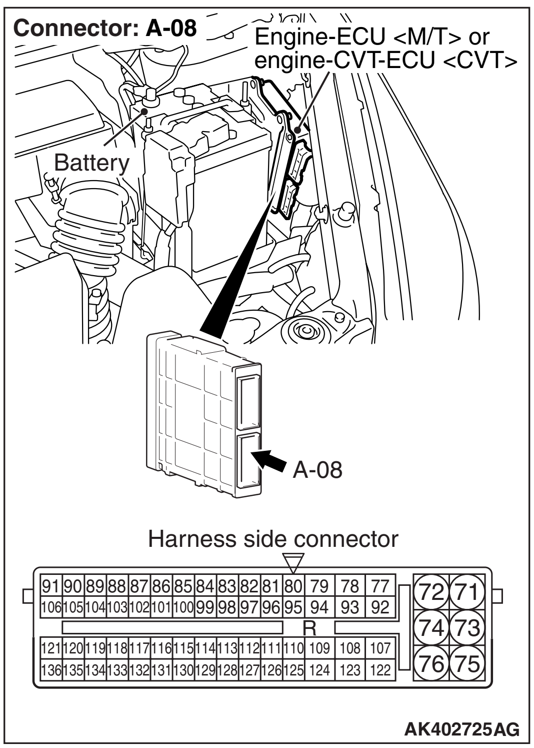
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace the connector.

STEP 8. Check harness between B-26 (terminal No. 4) accelerator pedal position sensor connector and A-08 (terminal No. 86) engine-ECU connector or engine-CVT-ECU connector.

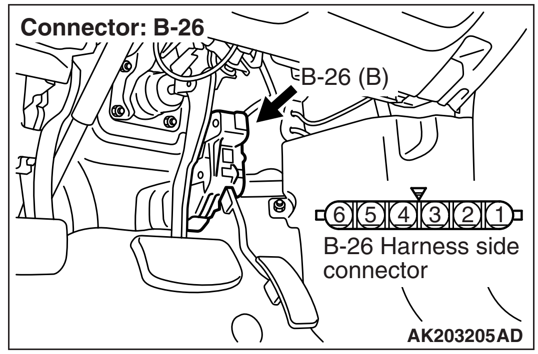


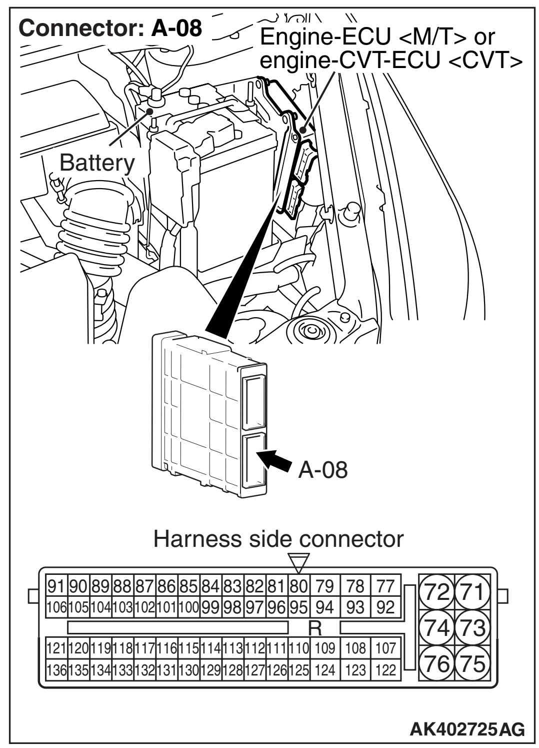


- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Repair the damaged harness wire.

STEP 9. Check harness between B-26 (terminal No. 6) accelerator pedal position sensor connector and A-08 (terminal No. 88) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 10 .
NO : Repair the damaged harness wire.

STEP 10. Replace the accelerator pedal assembly.

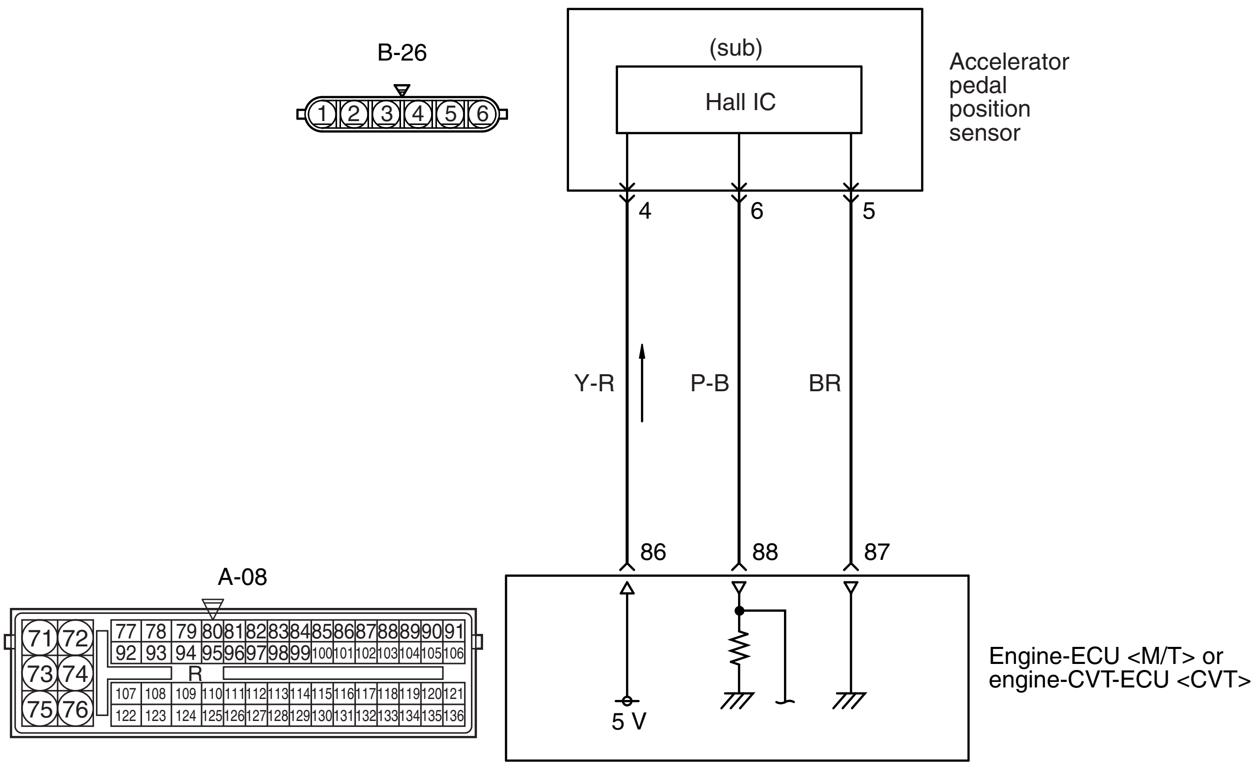
- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?
YES : Check end.
NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P2128: Accelerator Pedal Position Sensor (Sub) Circuit High Input

Accelerator Pedal Position Sensor (sub) Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402697AC

OPERATION

- A power voltage of 2.5 V is applied to the accelerator pedal position sensor (terminal No. 4) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 86).
- The power voltage is earthed to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 87) from the accelerator pedal position sensor (terminal No. 5).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 88) from the accelerator pedal position sensor output terminal (terminal No. 6).

FUNCTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Accelerator pedal position sensor (sub) output voltage is 2.5 V or more <M/T>.
- Accelerator pedal position sensor (sub) output voltage is 2.45 V or more for 1 second <CVT>.
- Accelerator pedal position sensor (main) output voltage is 0.2 – 4.8 V <CVT>.

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PROBABLE CAUSES

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

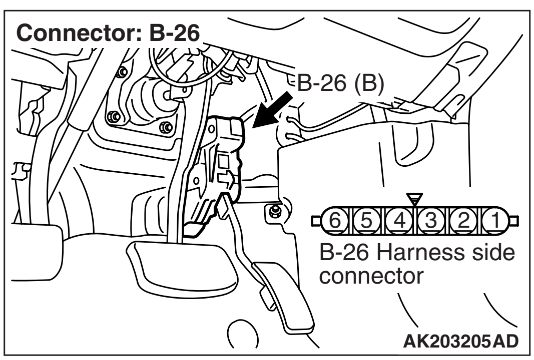
- Refer to Data List Reference Table P.13A-331.
  a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-26 accelerator pedal position sensor connector

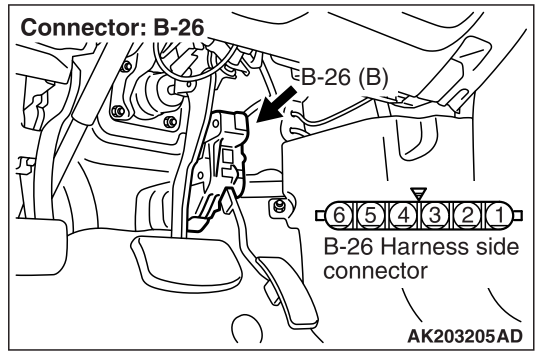


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at B-26 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 5 and earth.

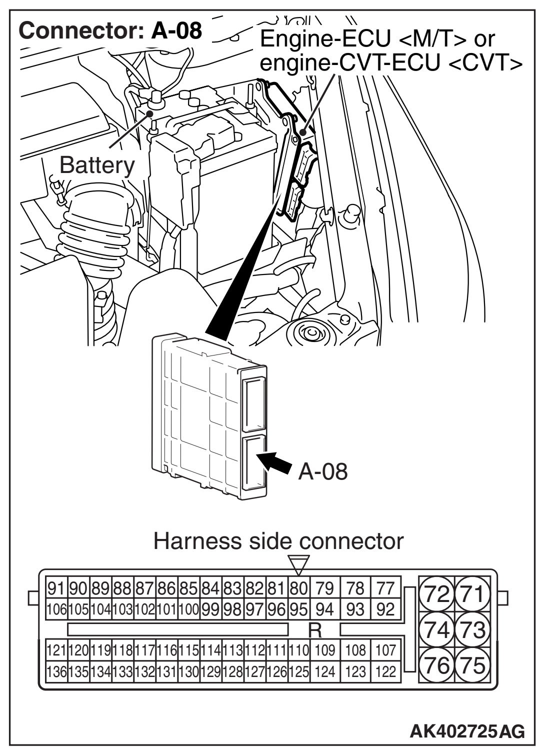
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



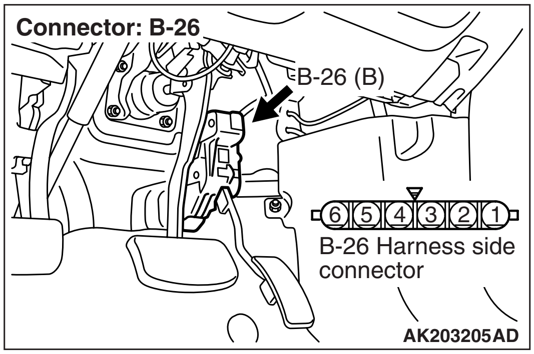
Q: Is the check result normal?

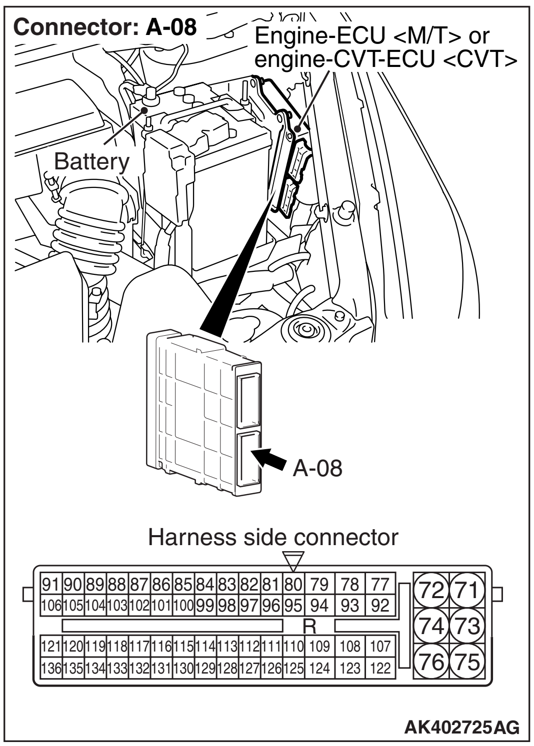
YES : Go to Step 5 .

NO : Repair or replace the connector.

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STEP 5. Check harness between B-26 (terminal No. 5) accelerator pedal position sensor connector and A-08 (terminal No. 87) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair the damaged harness wire.

STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 7. Replace the accelerator pedal assembly.

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.

NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P2135: Throttle Position Sensor (Main and Sub) Range/Performance Problem

OPERATION

- Refer to Code No. P0122: Throttle Position Sensor (main) Circuit Low Input P.13A-50.
- Refer to Code No. P0222: Throttle Position Sensor (sub) Circuit Low Input P.13A-109.

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks the throttle position sensor output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Throttle position sensor (main/sub) is normal.
- Throttle position sensor (main) output voltage is 0.2 V or more and 4.8 V or less <M/T>.
- Throttle position sensor (sub) output voltage is 0.2 V or more and 4.8 V or less <M/T>.
- Throttle position sensor (main) output voltage is 0.2 – 2.5 V <CVT>.
- The output voltage value of the sub throttle position sensor subtracted from 5 V equals 0.2 – 2.5 V <CVT>.
- The fully closed learning of the throttle valve is completed <CVT>.
- Battery positive voltage is more than 8.3 V <CVT>.

Judgment Criteria

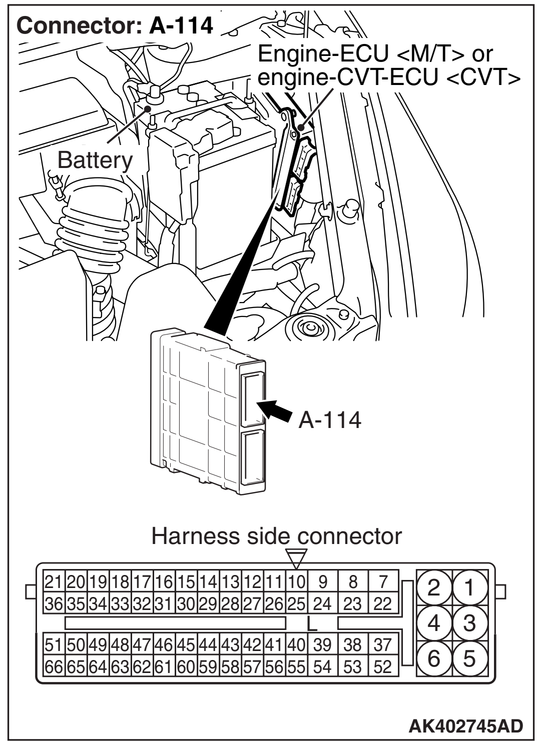
- Total output voltage sum of the throttle position sensor (main) and throttle position sensor (sub) is 4.5 V or more and 5.5 V or less <M/T>.
- Change of throttle position sensor (sub) output voltage per 25 milliseconds is lower than 0.1 V <CVT>.
- The output voltage sum of the throttle position sensor (main) and the throttle position sensor (sub) deviates from the specified range <CVT>.

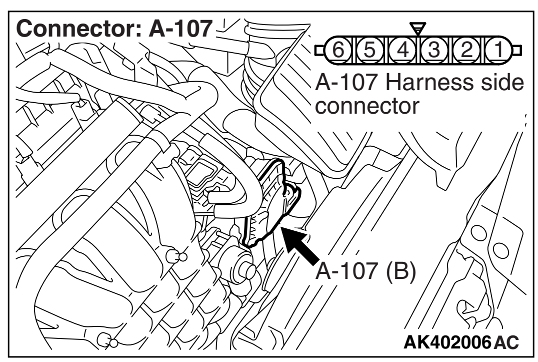
PROBABLE CAUSES

- Failed throttle position sensor
- Open/short circuit in throttle position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector and A-107 electronic-controlled throttle valve connector



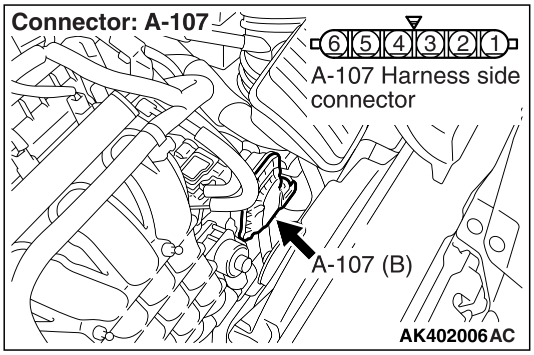


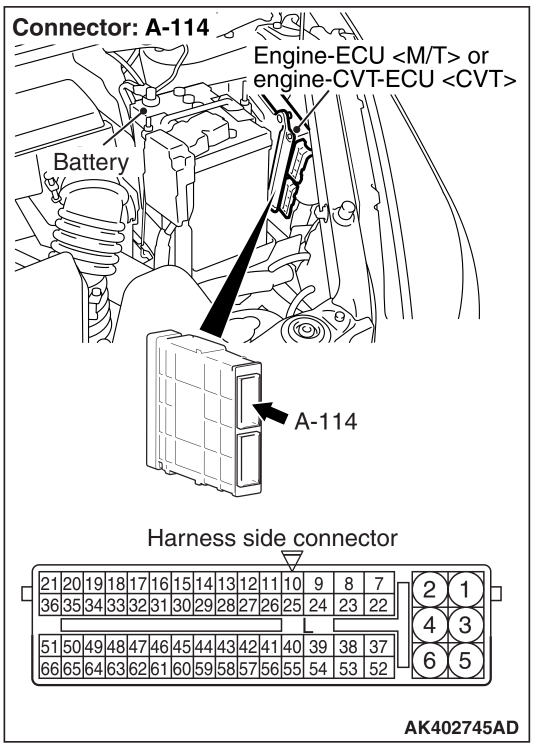
Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Check harness between A-107 (terminal No. 6) electronic-controlled throttle valve connector and A-114 (terminal No. 15) engine-ECU connector or engine-CVT-ECU connector.





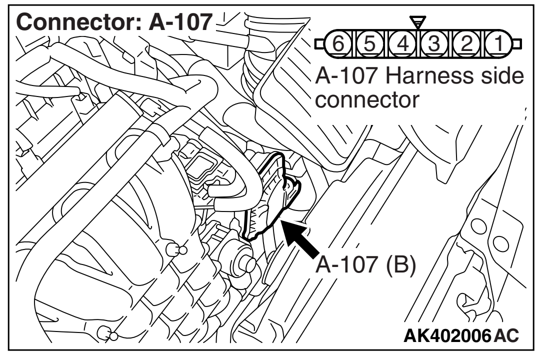
- Check output line for short circuit and damage.

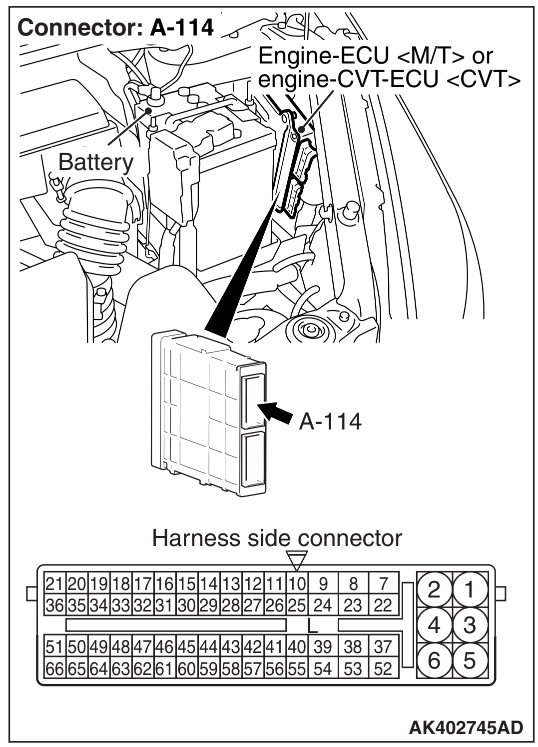
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair the damaged harness wire.

STEP 3. Check harness between A-107 (terminal No. 4) electronic-controlled throttle valve connector and A-114 (terminal No. 16) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair the damaged harness wire.

STEP 4. Replace throttle body assembly.

- After throttle body assembly is replaced, re-check for trouble symptom.

Q: Does trouble system persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Check end.

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Code No. P2138: Accelerator Pedal Position Sensor (Main and Sub) Range/Performance Problem

OPERATION

- Refer to Code No. P2122: Accelerator Pedal Position Sensor (main) Circuit Low Input P.13A-201.
- Refer to Code No. P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13A-208.

FUNCTION

- The engine-ECU <M/T> or engine-CVT-ECU <CVT> checks the accelerator pedal position sensor output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Not while engine is being cranked <M/T>.
- Battery voltage is more than 6.3 V <M/T>.
- Accelerator pedal position sensor (main) output voltage is 0.2 – 4.8 V.
- Accelerator pedal position sensor (sub) output voltage is more than 0.2 V and is less than 2.5 V <M/T>.
- Accelerator pedal position sensor (sub) output voltage is 0.2 – 4.8 V <CVT>.

Judgment Criteria

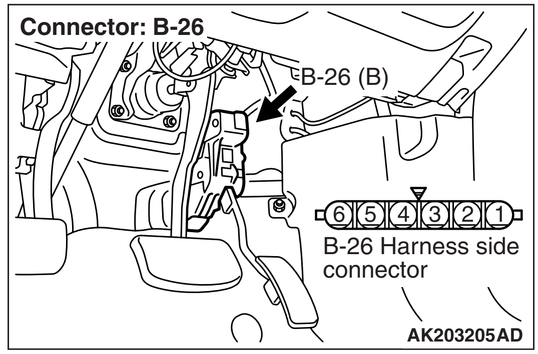
- When the variation in accelerator pedal position is small.
- The difference between twice the accelerator pedal position sensor (sub) output voltage and the accelerator pedal position sensor (main) output voltage is 0.3 V or more.

PROBABLE CAUSES

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-26 accelerator pedal position connector

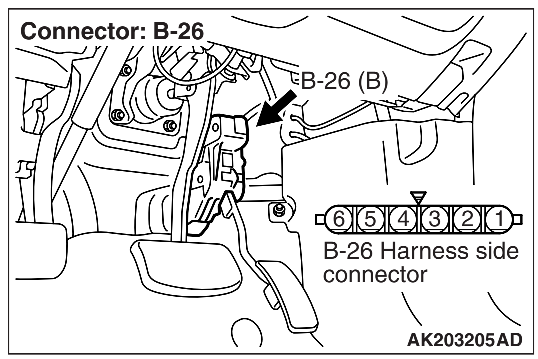


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at B-26 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

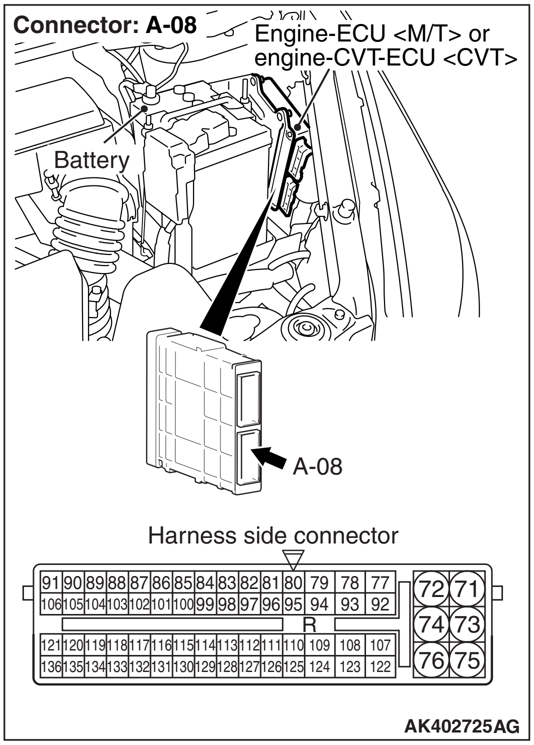
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 3 .

STEP 3. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

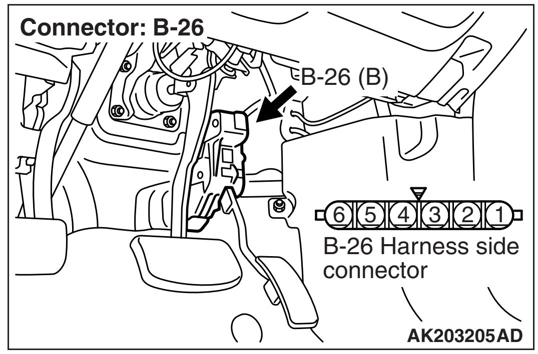


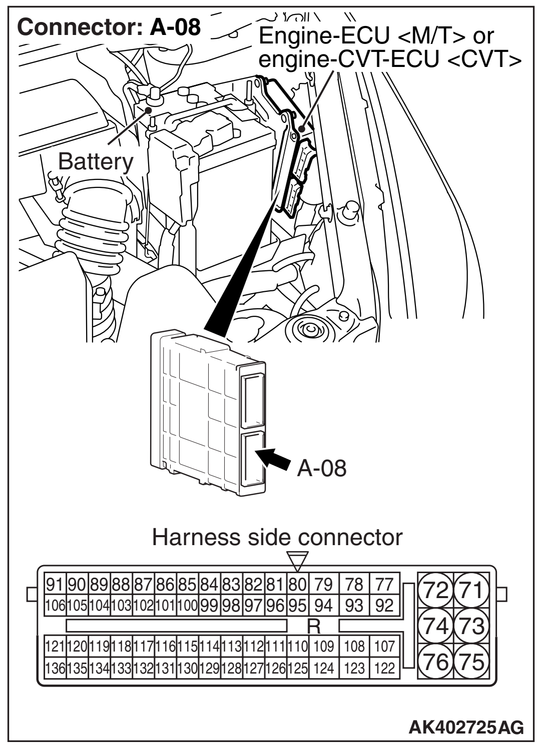
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace the connector.

STEP 4. Check harness between B-26 (terminal No. 2) accelerator pedal position sensor connector and A-08 (terminal No. 84) engine-ECU connector or engine-CVT-ECU connector.





- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair the damaged harness wire.

STEP 5. M.U.T.-III diagnosis code.

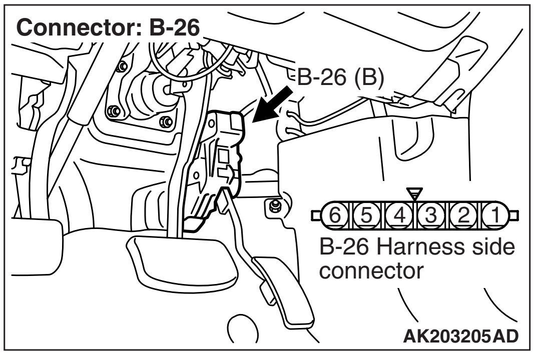
- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. Perform resistance measurement at B-26 accelerator pedal position sensor connector.

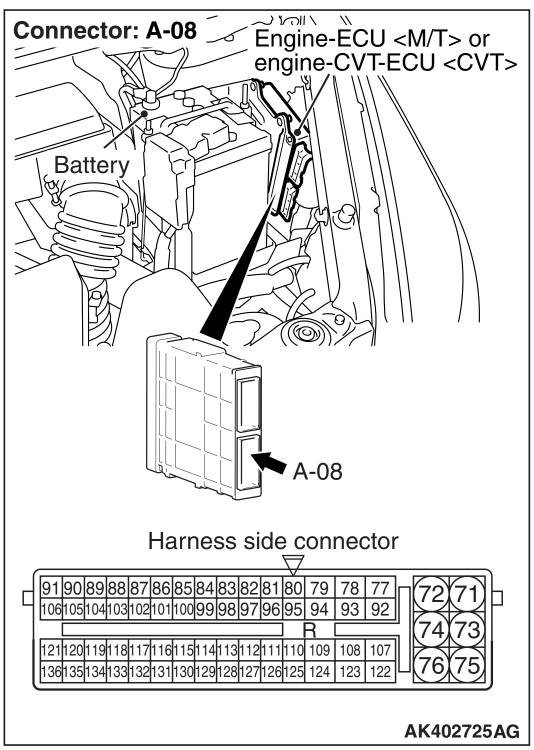


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 5 and earth.

OK: Continuity (2 Ω or less)

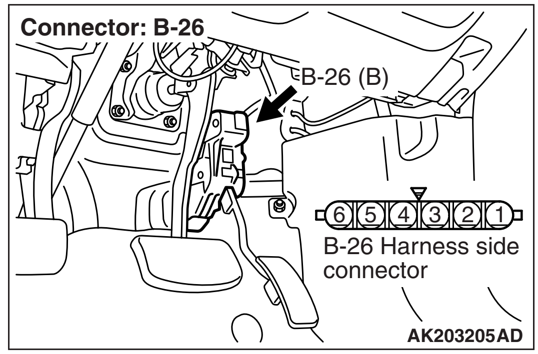
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 7 .

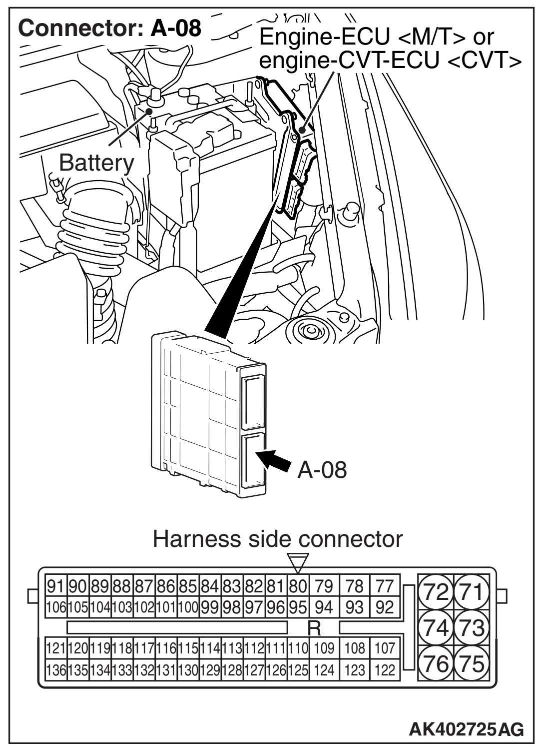
STEP 7. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair or replace the connector.

STEP 8. Check harness between B-26 (terminal No. 5) accelerator pedal position sensor connector and A-08 (terminal No. 87) engine-ECU connector or engine-CVT-ECU connector.



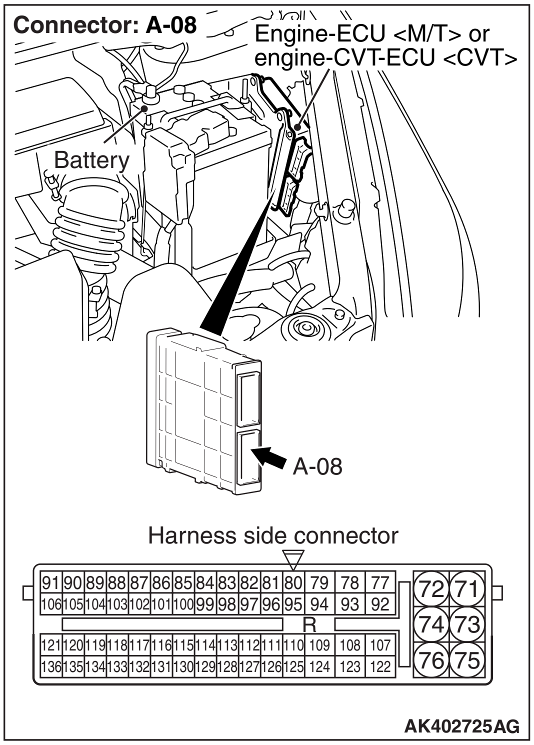


- Check earthing line for damage.

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Repair the damaged harness wire.

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STEP 9. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

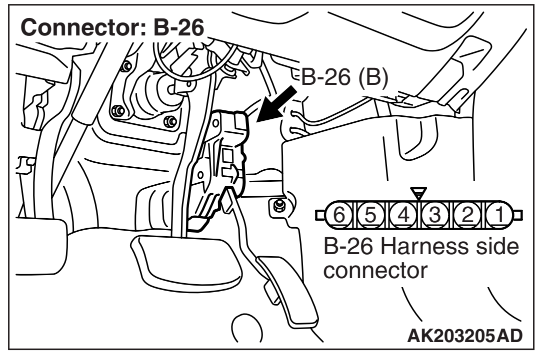


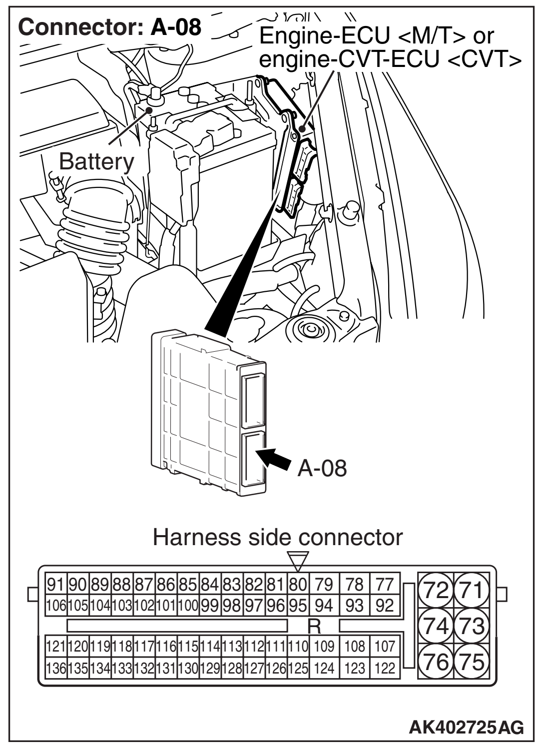
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace the connector.

STEP 10. Check harness between B-26 (terminal No. 4) accelerator pedal position sensor connector and A-08 (terminal No. 86) engine-ECU connector or engine-CVT-ECU connector.





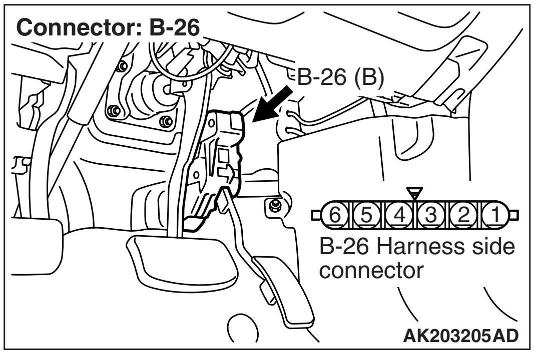
- Check power supply line for damage.

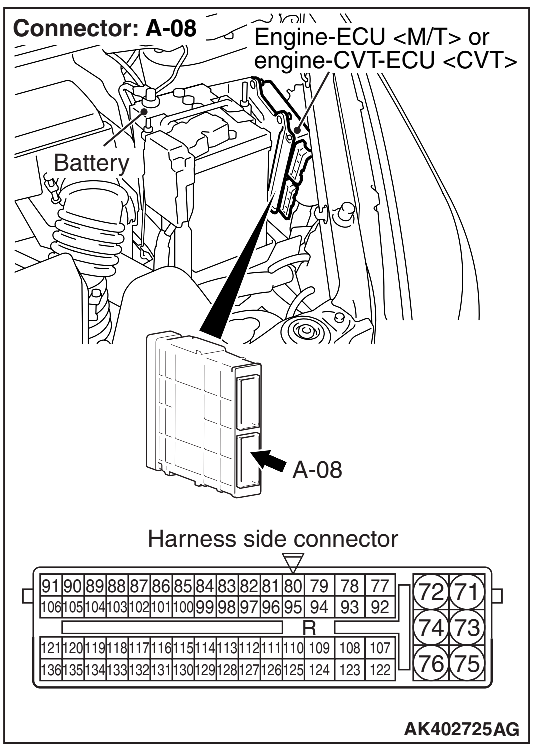
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair the damaged harness wire.

STEP 11. Check harness between B-26 (terminal No. 1) accelerator pedal position sensor connector and A-08 (terminal No. 85) engine-ECU connector or engine-CVT-ECU connector.





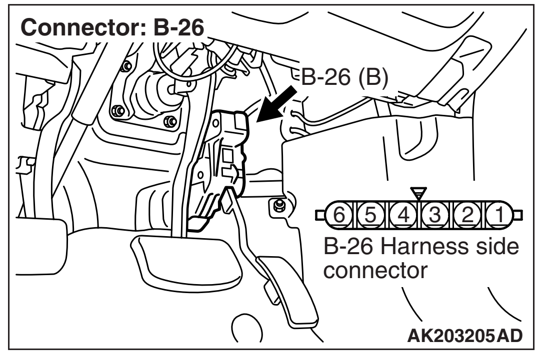
- Check power supply line for damage.

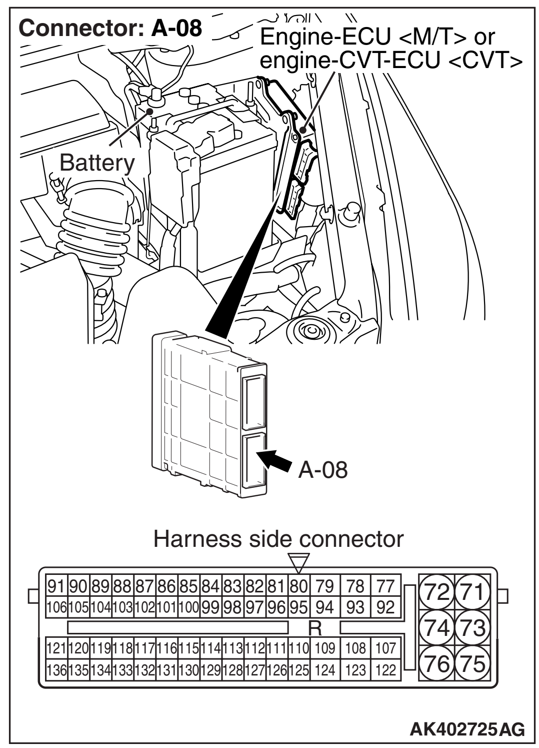
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair the damaged harness wire.

STEP 12. Check harness between B-26 (terminal No. 3) accelerator pedal position sensor connector and A-08 (terminal No. 83) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

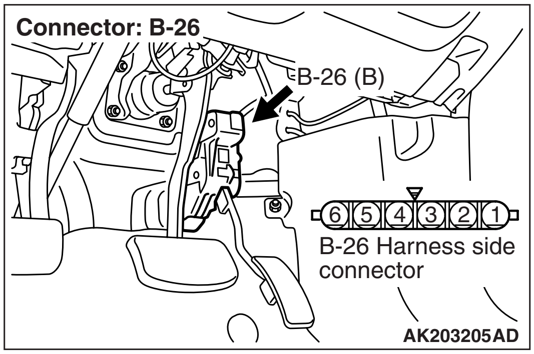
Q: Is the check result normal?

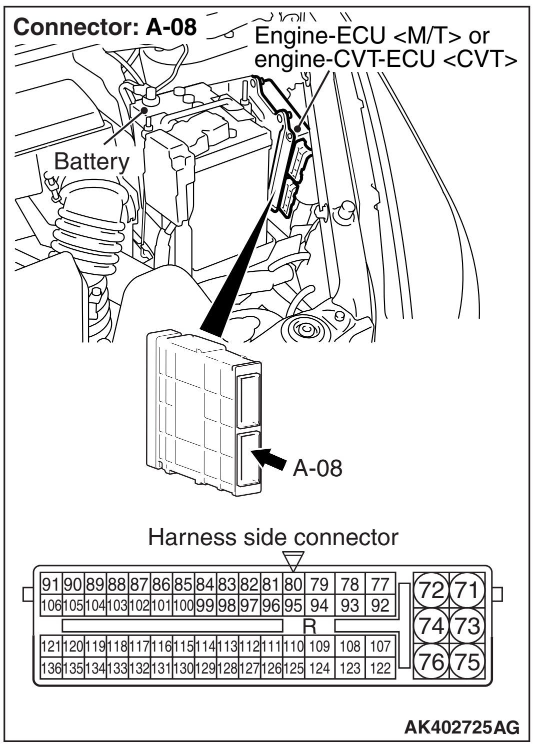
YES : Go to Step 13 .

NO : Repair the damaged harness wire.

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STEP 13. Check harness between B-26 (terminal No. 6) accelerator pedal position sensor connector and A-08 (terminal No. 88) engine-ECU connector or engine-CVT-ECU connector.





- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 14 .
NO : Repair the damaged harness wire.

STEP 14. Replace the accelerator pedal assembly.

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?
YES : Check end.
NO : Replace the engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Code No. P2226: Barometric Pressure Sensor System

FUNCTION

- The barometric pressure sensor converts the barometric pressure into a voltage signal and inputs the signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>.
- In response to the signal, the engine-ECU <M/T> or engine-CVT-ECU <CVT> corrects the fuel injection amount, etc.

TROUBLE JUDGMENT

Check Conditions

- 2 seconds later after the ignition switch has been in ON position or the engine has started up.
- The battery voltage is 8 V or more.

Judgment Criteria

- The sensor output voltage is 4.5 V or more (Barometric pressure of above 114 kPa or equivalent) for 4 seconds.

or

- The sensor output voltage is 0.2 V or less (Barometric pressure of below 5 kPa or equivalent) for 4 seconds.

PROBABLE CAUSE

- Failed barometric pressure sensor

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Code No. U1073: Bus Off

⚠ CAUTION

If diagnosis code U1073 is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>, surely perform CAN busline diagnosis.

⚠ CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position <M/T>.
- All the time <CVT>.

Judgment Criterion

- When the buss off error is detected.

COMMENT ON TROUBLE SYMPTOM

- The failure is possibly caused by malfunction of the harness and connector in CAN busline or by malfunction in engine-ECU <M/T> or engine-CVT-ECU <CVT>.

PROBABLE CAUSES

- Failed harness and connector in CAN busline
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. M.U.T.-III CAN bus diagnosis

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to 54D – Diagnosis – Can Bus Diagnosis Table P.54D-13), and then go to Step 3 .

STEP 2. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>, then go to Step 3 .

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 3. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Go to Step 1 .

NO : Check end.

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Code No. U1102: ABS-ECU Time-out

⚠ CAUTION

If diagnosis code U1102 is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>, surely perform CAN busline diagnosis.

⚠ CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- While the cranking switch is in OFF position, or when 3 seconds pass after the cranking switch is in OFF from ON.
- The battery voltage is 10 V or more.

Judgment Criterion

- The signals cannot be received from ABS-ECU through CAN busline.

COMMENT ON TROUBLE SYMPTOM

- **Current malfunction**

The failure is possibly caused by malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and ABS-ECU, by malfunction in the power supply system of ABS-ECU, in ABS-ECU itself, in engine-ECU <M/T> or engine-CVT-ECU <CVT>.

- **Past malfunction**

Focus on diagnosing malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and ABS-ECU as well as malfunction in the power supply system of ABS-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NOTE: In case of Past malfunction, M.U.T.-III CAN bus diagnosis cannot detect the failure even if there is malfunction in CAN bus, so that check CAN busline in the same way as Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13). The diagnosis codes being output to each ECU with CAN communication can narrow down the most suspected area. (Refer to GROUP54D – Diagnosis – CAN Bus Diagnosis Table P.54D-13).

PROBABLE CAUSES

- Failed harness and connector in CAN busline
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>
- Failed ABS-ECU

DIAGNOSIS

STEP 1. M.U.T.-III CAN bus diagnosis

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to GROUP54D – Diagnosis – CAN Bus Diagnosis Table P.54D-13), and then go to Step 6 .

STEP 2. M.U.T.-III other system diagnosis codes

- Confirm whether the diagnosis codes are output from ABS-ECU.

Q: Is the diagnosis code set?

YES : Perform the troubleshooting of ABS (Refer to GROUP 35B – Check Chart For Diagnosis Codes P.35B-7).

NO : Go to Step 3 .

STEP 3. M.U.T.-III other system diagnosis codes

Confirm whether Diagnosis Code U1102: ABS-ECU time-out is output from the following ECU having CAN communication with ABS-ECU

- EPS-ECU
- Combination meter-ECU

Q: Is the diagnosis code set?

YES : Go to Step 4 .

NO : Go to Step 5 .

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STEP 4. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace ABS-ECU, then go to Step 6 .

NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and ABS-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 5. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>, then go to Step 6 .

NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and ABS-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Go to Step 1 .

NO : Check end.

Code No. U1106: EPS Time-Out

⚠ CAUTION

If the engine-ECU <M/T> or engine-CVT-ECU <CVT> outputs the diagnosis code U1106, always carry out diagnosis of the CAN busline.

⚠ CAUTION

Absolutely confirm that the communication circuit is normal and then replace the ECU.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- While the cranking switch is in OFF position, or when 3 seconds pass after the cranking switch is in OFF from ON.
- The battery voltage is 10 V or more.

Judgment Criterion

- The signal sent by the EPS-ECU is not able to be received through the CAN busline.

Comments on malfunction phenomenon

Current malfunction

- The possible causes are that the harness and the connector have malfunction in the CAN busline between the engine-ECU <M/T> or engine-CVT-ECU <CVT> and the EPS-ECU, the power supply system in the EPS-ECU has malfunction, or the EPS-ECU/the engine-ECU <M/T> or engine-CVT-ECU <CVT> has malfunction.

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Previous malfunction

- Focus on diagnosing that the harness and the connector have malfunction in the CAN busline between the engine-ECU <M/T> or engine-CVT-ECU <CVT> and the EPS-ECU, or the power supply system in the EPS-ECU has malfunction. The diagnosis procedure is referred to strategy for Intermittent malfunction (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions P.00-13.

NOTE: In the case of the previous malfunction, malfunction cannot be found through the diagnose of M.U.T.-III CAN busline even if the CAN busline has malfunction; therefore check for the CAN busline in the same way as Intermittent malfunction (Refer to GROUP00 - How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions P.00-13. By the diagnosis code, which is output to the ECU where the CAN communication is performed, can narrow down the area to the most suspected place P.54D-13.

PROBABLE CAUSES

- Failed harness and connector
- Failed EPS-ECU
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Diagnosis of M.U.T.-III CAN busline

- Using M.U.T.-III, carry out diagnosis of the CAN busline.

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Repair the CAN busline (Refer to GROUP 54D – Diagnosis – Can Bus Diagnosis Table P.54D-13). After repairing the CAN busline, go to Step 6 .

STEP 2. M.U.T.-III diagnosis code

- Confirm whether the EPS-ECU outputs the diagnosis code.

Q: Is the diagnosis code set?

YES : Carry out troubleshooting of the EPS. (Refer to GROUP 37 – Check Chart for Diagnosis Codes P.37-9.
NO : Go to Step 3 .

STEP 3. M.U.T.-III diagnosis code

Confirm whether the ECU indicated below, which carry out communication between the EPS-ECU and the CAN, outputs the diagnosis code U1106 (EPS-ECU CAN Communication Time-out).

- Meter -A/C-ECU.

Q: Is the diagnosis code set?

YES : Go to Step 4 .
NO : Go to Step 5 .

STEP 4. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Clear the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace EPS-ECU, then go to Step 6 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 5. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Clear the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>, then go to Step 6 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Clear the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Go to Step 1 .
NO : Check end.

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Code No. U1108: Combination Meter Time-out

⚠ CAUTION

If diagnosis code U1108 is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>, surely perform CAN busline diagnosis.

⚠ CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- While the cranking switch is in OFF position, or when 3 seconds pass after the cranking switch is in OFF from ON.
- The battery voltage is 10 V or more.

Judgment Criterion

- The signals cannot be received from combination meter through CAN busline.

COMMENT ON TROUBLE SYMPTOM

Current malfunction

- The failure is possibly caused by malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and combination meter, by malfunction in the power supply system of combination meter, in combination meter itself, in engine-ECU <M/T> or engine-CVT-ECU <CVT>.

Past malfunction

- Focus on diagnosing malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and combination meter as well as malfunction in the power supply system of combination meter (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NOTE: In case of Past malfunction, M.U.T.-III CAN bus diagnosis cannot detect the failure even if there is malfunction in CAN bus, so that check CAN busline in the same way as Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13). The diagnosis codes being output to each ECU with CAN communication can narrow down the most suspected area (Refer to GROUP 54D – Diagnosis – Can Bus Diagnosis Table P.54D-13).

PROBABLE CAUSES

- Failed harness and connector in CAN busline
- Failed combination meter
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. M.U.T.-III CAN bus diagnosis

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Correct CAN busline (Refer to GROUP 54D – Diagnosis – CAN Bus Diagnosis Table P.54D-13), and then go to Step 6 .

STEP 2. M.U.T.-III other system diagnosis code

- Confirm whether the diagnosis code is output from combination meter.

Q: Is the diagnosis code set?

YES : Perform the troubleshooting of combination meter (Refer to GROUP 54A – Combination Meter – Check Chart for Diagnosis Codes P.54A-31).
NO : Go to Step 3 .

STEP 3. M.U.T.-III other system diagnosis code

Confirm whether diagnosis code U1108: combination meter time-out is output from the following ECU having CAN communication with combination meter

- ETACS-ECU

Q: Is the diagnosis code set?

YES : Go to Step 4 .
NO : Go to Step 5 .

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STEP 4. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace combination meter, then go to Step 6 .

NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and combination meter (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 5. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>, go to Step 6 .

NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and combination meter (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Go to Step 1 .

NO : Check end.

Code No. U1110: A/C-ECU Time-Out

⚠ CAUTION

If diagnosis code U1110 is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>, surely perform CAN busline diagnosis.

⚠ CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position <M/T>.
- While the cranking switch is in OFF position, or when 3 seconds pass after the cranking switch is in OFF from ON.
- The battery voltage is 10 V or more.

Judgment Criterion

- The signals cannot be received from A/C-ECU through CAN busline.

COMMENT ON TROUBLE SYMPTOM

Current malfunction

- The failure is possibly caused by malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and A/C-ECU, by malfunction in the power supply system of A/C-ECU, in A/C-ECU itself, in engine-ECU <M/T> or engine-CVT-ECU <CVT>.

Past malfunction

- Focus on diagnosing malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and A/C-ECU as well as malfunction in the power supply system of A/C-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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NOTE: In case of Past malfunction, M.U.T.-III CAN bus diagnosis cannot detect the failure even if there is malfunction in CAN bus, so that check CAN busline in the same way as Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13). The diagnosis codes being output to each ECU with CAN communication can narrow down the most suspected area (Refer to GROUP 54D – Diagnosis – CAN Bus Diagnosis Table P.54D-13).

PROBABLE CAUSES

- Failed harness and connector in CAN busline
- Failed A/C-ECU
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS

STEP 1. M.U.T.-III CAN bus diagnosis

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Correct CAN busline (Refer to GROUP 54D – Diagnosis – CAN Bus Diagnosis Table P.54D-13), and then go to Step 6 .

STEP 2. M.U.T.-III other system diagnosis code

- Confirm whether the diagnosis code is output from A/C-ECU.

Q: Is the diagnosis code set?

YES : Perform the troubleshooting of A/C-ECU (Refer to GROUP 55 – Troubleshooting – Diagnostic Table Code Chart P.55A-5).
NO : Go to Step 3 .

STEP 3. M.U.T.-III other system diagnosis codes

Confirm whether Diagnosis Code U1110 A/C-ECU time-out is output from the following ECU having CAN communication with A/C-ECU.

- ETACS-ECU

Q: Is the diagnosis code set?

YES : Go to Step 4 .
NO : Go to Step 5 .

STEP 4. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace A/C-ECU, then go to Step 6 .
NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and A/C-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 5. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>, go to Step 6 .
NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-CVT-ECU <CVT> and A/C-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is output from engine-ECU <M/T> or engine-CVT-ECU <CVT>.
  1. Erase the diagnosis code being output.
  2. Ignition switch: LOCK (OFF) to ON
  3. Confirm whether the diagnosis code is output.

Q: Is the diagnosis code set?

YES : Go to Step 1 .
NO : Check end.

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INSPECTION CHART FOR TROUBLE SYMPTOMS

M1131151501945

Items	Trouble symptom		Inspection procedure No.
Communication with M.U.T.-III is impossible	Communication with engine-ECU <M/T> or engine-CVT-ECU <CVT> only is not possible		1
Engine warning lamp	The engine warning lamp does not illuminate right after the ignition switch is turned the ON position		2
	The engine warning lamp remains illuminating and never goes out		3
Starting	Starting impossible (No initial combustion) <M/T>	The starter is impossible to operate.	4
	Starting impossible (No initial combustion) <CVT>	The starter is impossible to operate.	5
	Starting impossible (Starter operative but no initial combustion)	The starter is operative and cranks the engine, but none of initial combustion is in the cylinders and the engine is not started.	6
	Starting impossible (Initial combustion but no complete combustion)	The initial combustion occurs, but the engine stalls soon due to the incomplete combustion.	7
	Improper starting (Long time to start)	It is long cranking to start the engine.	
Improper idling	Unstable idling (Rough idling, hunting)	The engine speed is not constant and changeable during the idling. Usually, the judgment can be based on the movement of the tachometer pointer, also on the vibration transmitted to the steering wheel, sift lever, vehicle body and so on.	8
	Improper idling speed	The proper idling speed is not satisfied.	
	Engine stalled during idling (Die out)	The engine stalls during the idling in no relation to the vehicle movement.	
Engine stalls	The engine stalls when starting the car (Pass out)	The engine stalls during the operation, or when the accelerator pedal is depressed from the idling.	9
	The engine stalls when decelerating	The engine stalls at the deceleration.	10

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Items	Trouble symptom		Inspection procedure No.
Driving	Engine does not revolve up	The engine speed is not higher when the accelerator pedal is depressed.	11
	Hesitation, sag	The response of vehicle speed (engine speed) is delayed when the accelerator pedal is depressed, or the vehicle speed (engine speed) is temporarily dropped during the acceleration. These phenomena are called "hesitation" and the serious hesitation is called "sag".	12
	Poor acceleration	The engine cannot obtain the acceleration corresponding to the degree of throttle opening although the engine is smooth at the constant speed.	
	Stumble	The engine speed increase is delayed when the accelerator pedal is initially depressed at the starting.	
	Surge	The vehicle body is repeated to vibrate jollity in the forward and backward directions at the constant speed or acceleration.	
	The feeling of impact or vibration when accelerating	The large impact feeling occurs at the acceleration.	13
	The feeling of impact or vibration when decelerating	The large impact feeling occurs at the deceleration.	14
	Knocking	Sharp sound like a hammer striking on the cylinder walls during the driving can be heard and wrongly affects the driving.	15
	Ignition timing offset	The basic ignition timing is deviated from the datum value.	16
Stopping	Run on (Dieseling)	The engine continues to run after the ignition switch is in "LOCK " (OFF) position.	17
Exhaust gas	Odor, white smoke, black smoke, high-concentration CO/HC during idling	The exhaust gas is extremely rank odor, white smoke or black smoke. The concentration of CO & HC is high during the idling.	18
Charging performance	Battery run down	The battery is soon rundown or the charging ability of battery is small.	19

Items	Trouble symptom		Inspection procedure No.
Cooling performance	Overheating	The temperature of engine cooling water is extremely high.	20
	Abnormal rotation of fan motor	The fan motor is abnormally rotated when the ignition switch is in ON position in no relation to the engine cooling water temperature.	21
A/C performance	Poor A/C performance	The temperature of air cooling from A/C is not efficient or very far from the target temperature.	22

PROBLEM SYMPTOMS TABLE

⚠ CAUTION

If the ignition switch is turned to the "ON" position with a connector or other electrical connections disconnected during troubleshooting of a system, a diagnosis code may be set for other systems. After finishing troubleshooting, check diagnosis codes for all systems, and if any codes have been set, erase these codes.

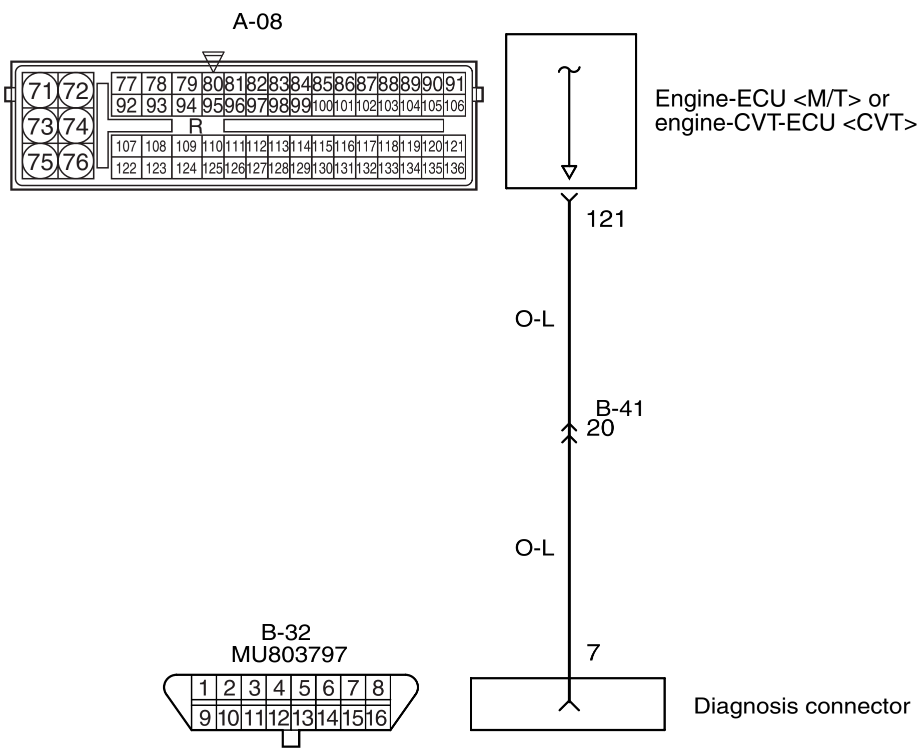
Inspection procedure No.	Trouble symptom	Reference page
1	Communication with engine-ECU <M/T> or engine-CVT-ECU <CVT> is not possible	P.13A-235
2	The engine warning lamp does not illuminate right after the ignition switch is turned the ON position	P.13A-237
3	The engine warning lamp remains illuminating and never goes out	P.13A-237
4	Starting impossible (No initial combustion) <M/T>	P.13A-238
5	Starting impossible (No initial combustion) <CVT>	P.13A-245
6	Starting impossible (Starter operative but no initial combustion)	P.13A-250
7	Starting impossible (Initial combustion but no complete combustion)	P.13A-253
	Starting impossible (Long time to start)	
8	Unstable idling (Rough idling, hunting)	P.13A-255
	Improper idling speed (Too high or too low)	
	Engine stalls during idling (Die out)	
9	The engine stalls when starting the car (pass out)	P.13A-259
10	The engine stalls when decelerating	P.13A-260
11	Engine does not revolve up	P.13A-261
12	Hesitation, sag	P.13A-262
	Poor acceleration	
	Stumble	
	Surge	
13	The feeling of impact or vibration when accelerating	P.13A-264
14	The feeling of impact or vibration when decelerating	P.13A-265

Inspection procedure No.	Trouble symptom	Reference page
15	Knocking	P.13A-266
16	Ignition timing offset	P.13A-267
17	Run on (Dieseling)	P.13A-268
18	Odor, white smoke, black smoke, high-concentration CO/HC during idling	P.13A-269
19	Battery run down	P.13A-271
20	Overheating	P.13A-274
21	Abnormal rotation of fan motor	P.13A-275
22	Poor A/C performance	P.13A-280
23	Engine-ECU <M/T> or engine-CVT-ECU <CVT> power supply, engine control relay, ignition switch-IG1 system	P.13A-281
24	Fuel pump system	P.13A-289
25	Fan control relay system	P.13A-302
26	A/C compressor relay system	P.13A-310
27	Stop lamp switch system	P.13A-316
28	Ignition circuit system	P.13A-320
29	Purge control solenoid valve system	P.13A-325

SYMPTOM PROCEDURES

Inspection Procedure 1: Communication with engine-ECU <M/T> or engine-CVT-ECU <CVT> is not possible.

Diagnosis Connector Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

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OPERATION

- There is data communication between diagnosis connector output terminal (terminal No. 7) and engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 121).

COMMENT ON TROUBLE SYMPTOM

- The failure possibly occurs when engine-ECU <M/T> or engine-CVT-ECU <CVT> detects malfunction, or is caused by malfunction of open or short in the combination meter circuit.

PROBABLE CAUSES

- Open/short/damaged circuit in engine-ECU <M/T> or engine-CVT-ECU <CVT> power circuit
- Open/short/damaged circuit between engine-ECU <M/T> or engine-CVT-ECU <CVT> and diagnosis connector
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

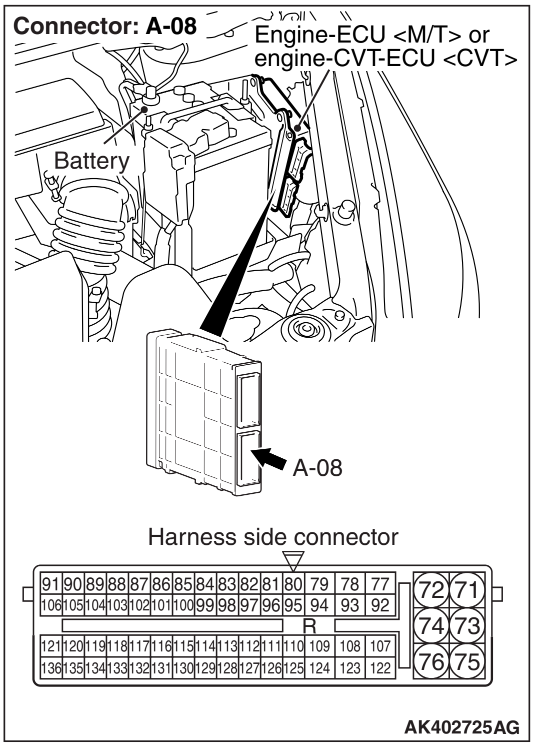
STEP 1. Check start - up.

Q: Is engine started

YES : Go to Step 2 .

NO : Check engine-ECU <M/T> or engine-CVT-ECU <CVT> power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 P.13A-281).

STEP 2. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

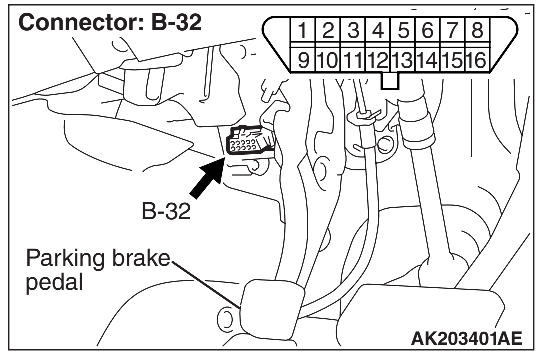


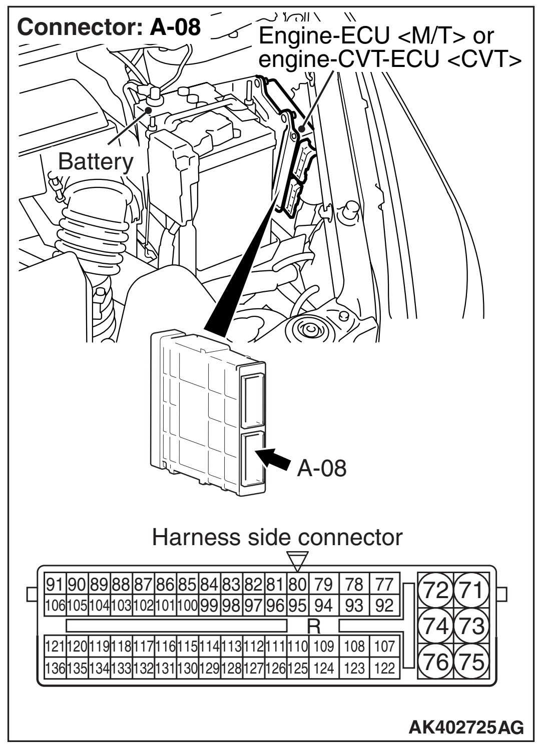
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check harness between B-32 (terminal No. 7) diagnosis connector and A-08 (terminal No. 121) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connectors B-41 and repair if necessary.

- Check communication line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair the damaged harness wire.

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STEP 4. Check the trouble symptom.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Inspection Procedure 2: The Engine Warning Lamp Does Not Illuminate Right after the Ignition Switch is Turned the "ON" Position

COMMENTS ON TROUBLE SYMPTOM

- The combination meter illuminates engine warning lamp for 5 seconds just after the ignition switch is in ON position.
- If engine warning lamp does not illuminate just after the ignition switch is in ON position, the failure is possibly caused by malfunction of engine warning lamp, open or short in the combination meter circuits and so on.

PROBABLE CAUSES

- Failed engine warming lamp
- Open/short circuit in combination meter

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 2 .

STEP 2. Check the trouble symptoms.

Q: Does trouble system persist?

YES : Replace combination meter assembly.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Inspection Procedure 3: The engine warning lamp remains illuminating and never goes out

COMMENT ON TROUBLE SYMPTOM

- Engine-ECU <M/T> or engine-CVT-ECU <CVT> has detected failed sensor or failed actuator. Or failure is possibly caused by short circuit or other faults.

PROBABLE CAUSE

- Short circuit in combination meter

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20.)

NO : Go to Step 2 .

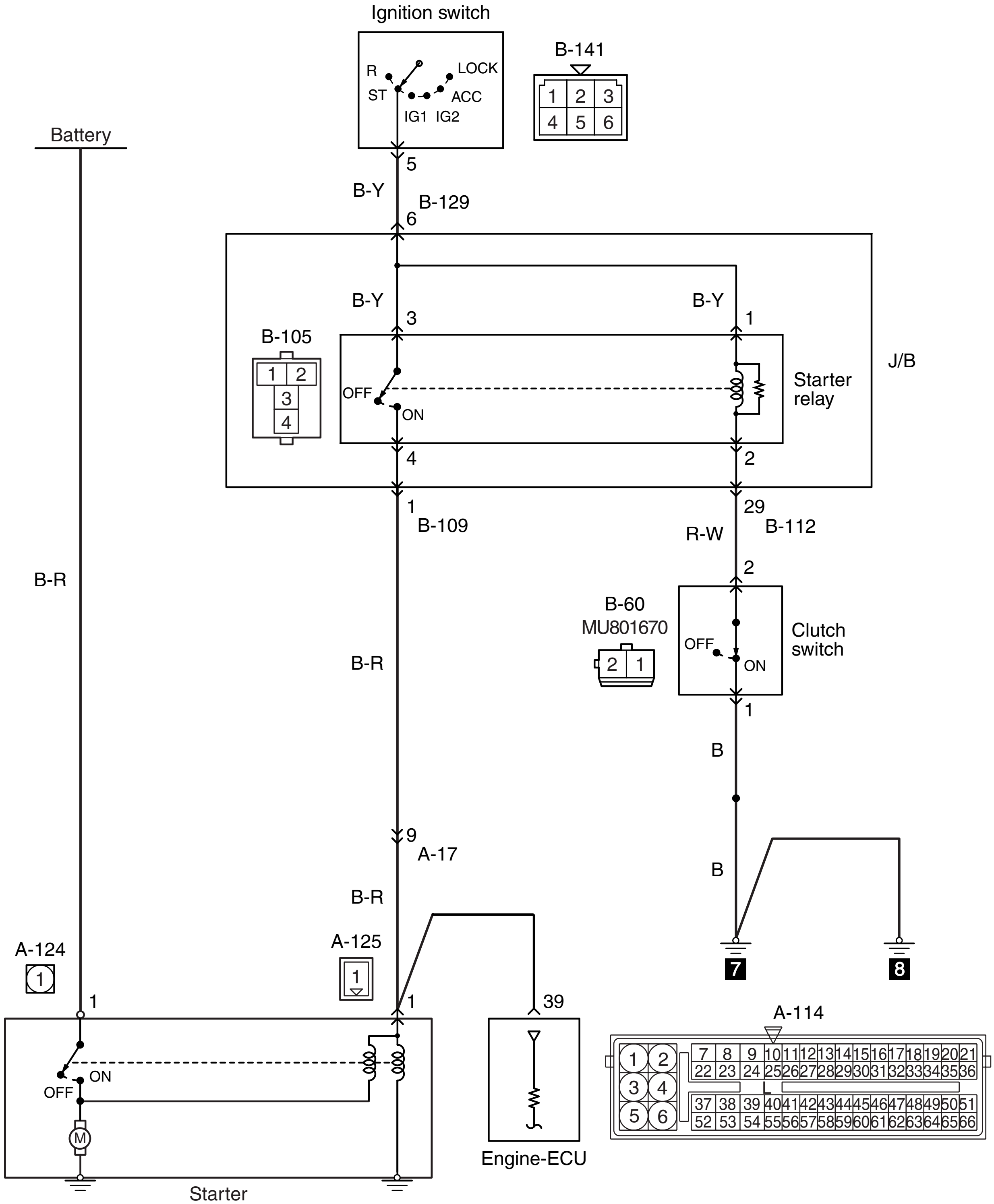
STEP 2. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace combination meter assembly.

NO : Intermittent malfunction (Refer to GROUP00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Inspection Procedure 4: Starting impossible (No initial combustion) <M/T>



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

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OPERATION

- When the ignition switch is turned to the "START" position and the clutch switch is in ON position (the clutch is depressed), the starter relay turns on.
- If the ignition switch is turned to "START" position, battery voltage is applied to the starter (Terminal No.1) through the starter relay.
- If the ignition switch is tuned to "START" position battery voltage is applied to engine-ECU (terminal No.39) from ignition switch. Because of this, engine ECU detects that the engine is cranked.

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed starter itself or failed related circuit.

PROBABLE CAUSES

- Failed battery
- Failed starter motor
- Open/short circuit in starter associated circuit or loose connector contact

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test P.54A-5).

STEP 2. M.U.T.-III data list

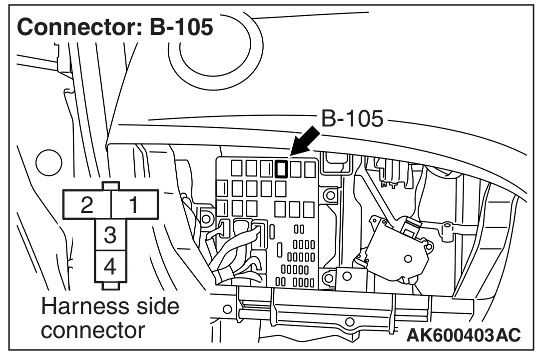
- Item 18: Cranking signal

OK:
ON (Ignition switch: ST)
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 17 .
NO : Go to Step 3 .

STEP 3. Connector check: B-105 starter relay connector



Q: Is the check result normal?

YES : Go to Step 4 .
NO : Repair or replace.

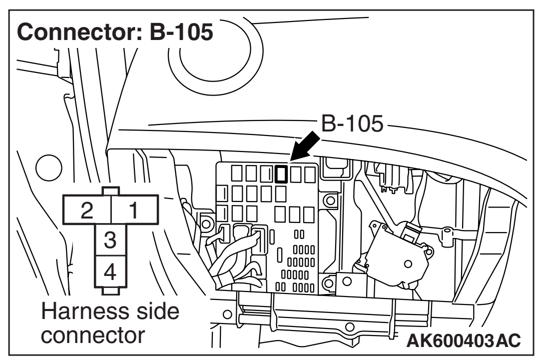
STEP 4. Check starter relay.

- Check starter relay (Refer to GROUP 16 – Starting system – Starter relay check P.16-21).

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Replace starter relay.

STEP 5. Perform voltage measurement at B-105 starter relay connector.



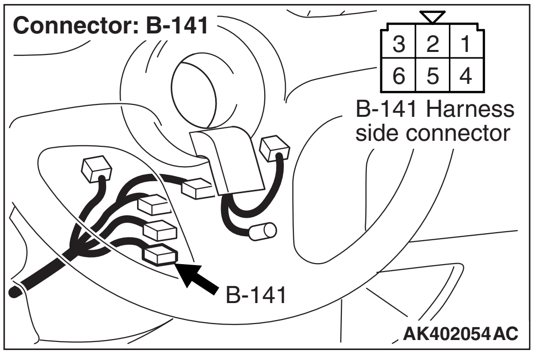
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1, 3 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .
NO : Go to Step 6 .

STEP 6. Connector check: B-141 ignition switch connector

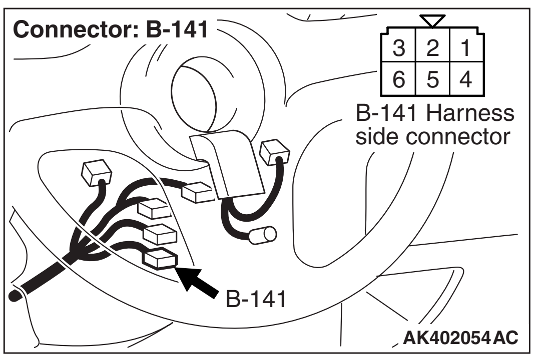


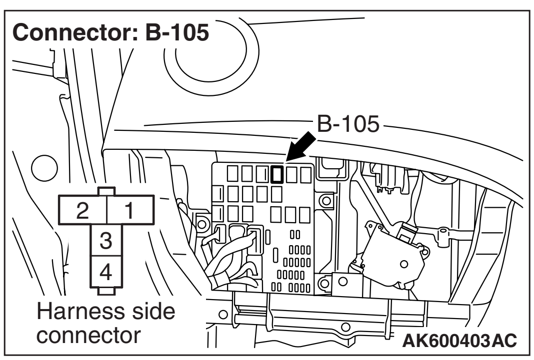
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check ignition switch.





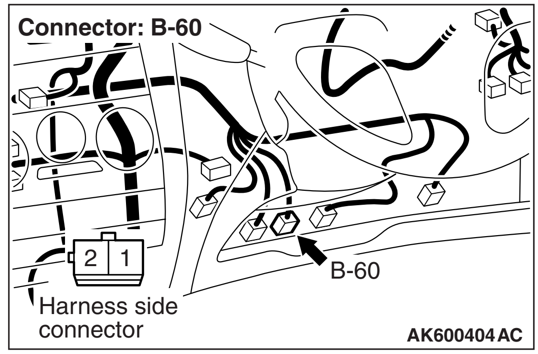
- Check ignition switch (Refer to GROUP 54 – Ignition Switch – Ignition Switch – Inspection P.54A-27).

Q: Is the check result normal?

YES : Check intermediate connector B-129, and repair if necessary. If intermediate connector is normal, check and repair harness between B-141 (terminal No. 5) ignition switch connector and B-105 starter relay connector.
- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 8. Connector check: B-60 clutch switch connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check clutch switch.

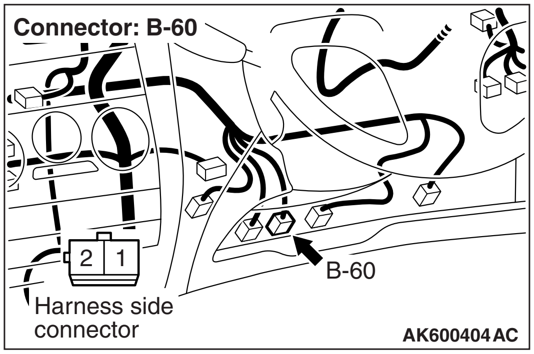
- Check clutch switch (Refer to GROUP 21 – Clutch pedal check).

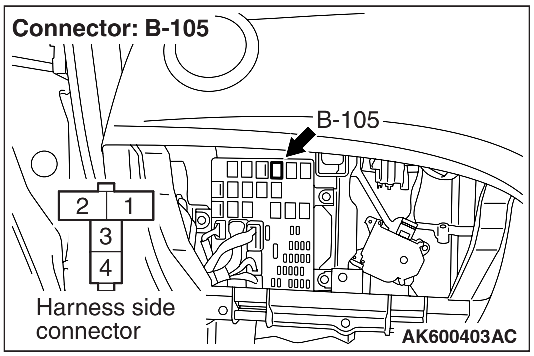
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Replace clutch switch.

STEP 10. Perform voltage measurement at B-60 clutch switch connector.





- Disconnect connector, and measure at the harness side
- Ignition switch: ST
- Voltage between terminal No. 2 and earth.

OK: System voltage

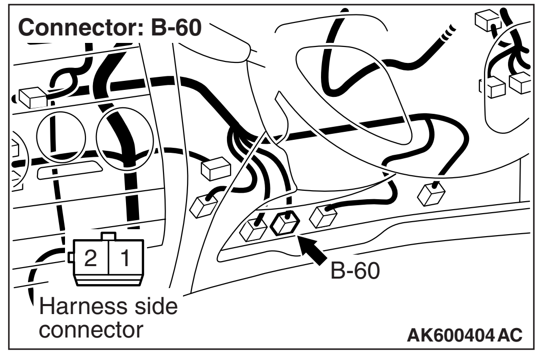
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Check intermediate connector B-112, and repair if necessary. If intermediate connector is normal, check and repair harness between B-105 (terminal No. 2) starter relay connector and B-60 (terminal No. 2) clutch switch connector.

- Check power supply line for open/short circuit.

STEP 11. Perform resistance measurement at B-60 clutch switch connector.



- Disconnect connector, and measure at the harness side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2Ω or less)

Q: Is the check result normal?

YES : Go to Step 12 .

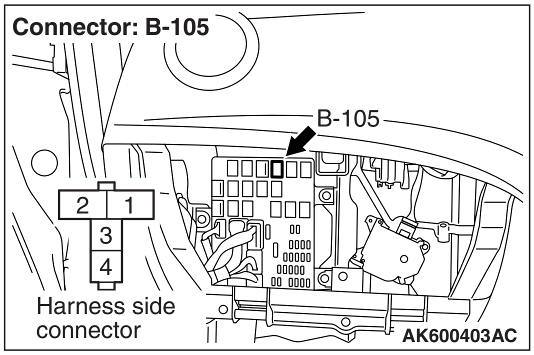
NO : Check and repair harness between B-60 (terminal No. 1) clutch switch connector and body earth. Check earth line for open circuit and damage.

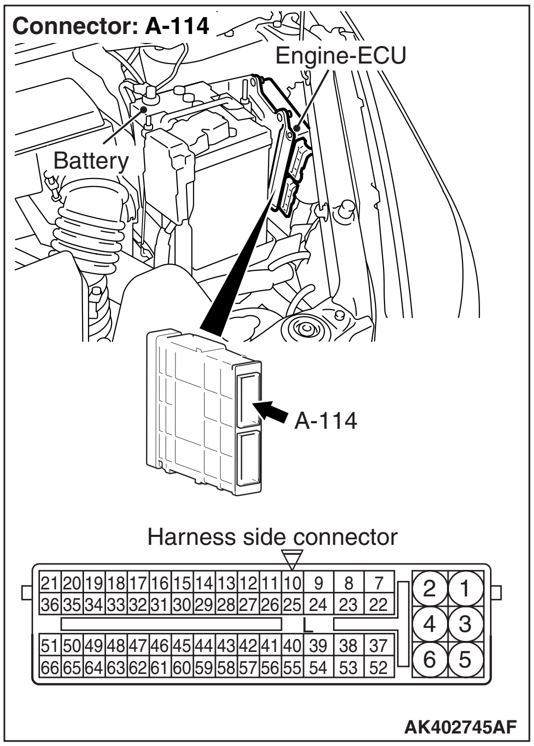
- Check earth line for open circuit and damage.

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STEP 12. Check harness between B-105 (terminal No. 4) starter relay connector and A-114 (terminal No. 39) engine-ECU connector.





NOTE: Before checking harness, check intermediate connectors B-109 and A-17, and repair if necessary.

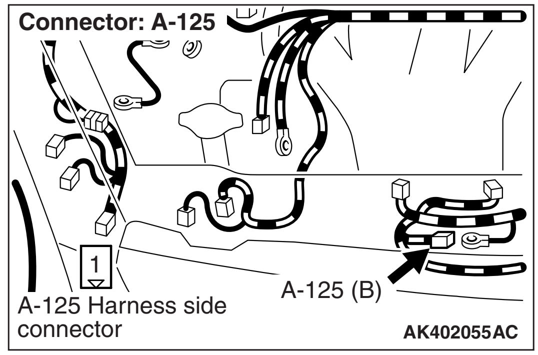
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. Connector check: A-125 starter connector

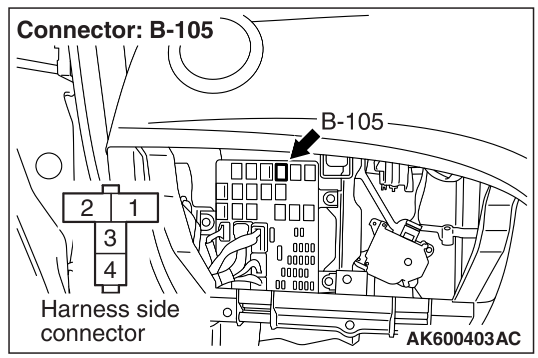


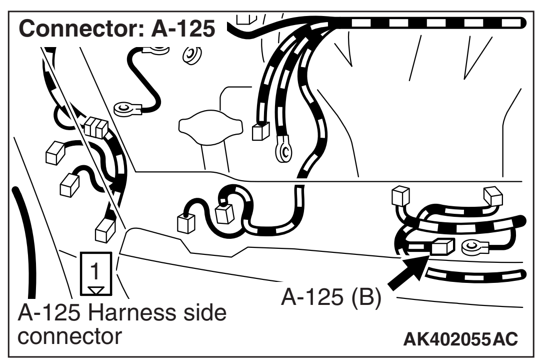
Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair or replace.

STEP 14. Check harness between B-105 (terminal No. 4) starter relay connector and A-125 (terminal No. 1) starter connector.





NOTE: Before checking harness, check intermediate connectors B-109 and A-17, and repair if necessary.

- Check output line for short circuit.

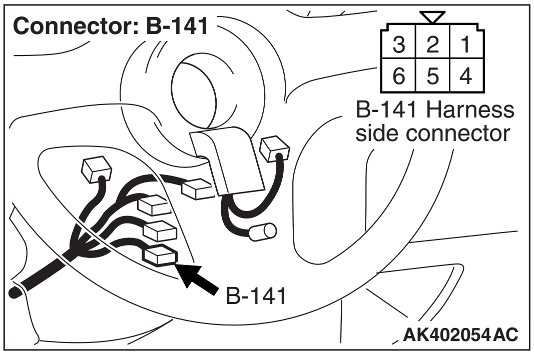
Q: Is the check result normal?

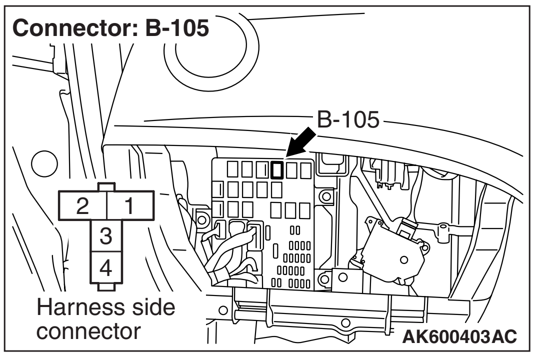
YES : Go to Step 15 .

NO : Repair.

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STEP 15. Check harness between B-141 (terminal No. 5) ignition switch connector and B-105 (terminal No. 1, 3) starter relay connector.



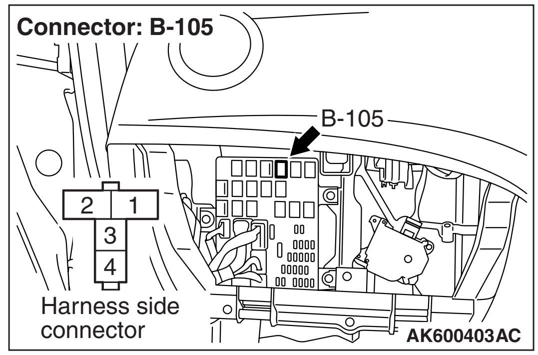


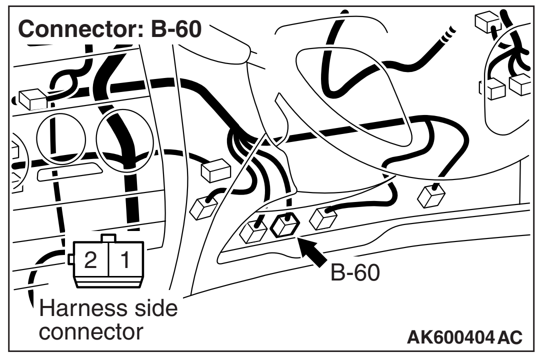
NOTE: Before checking harness, check intermediate connectors B-129, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 16 .
NO : Repair.

STEP 16. Check harness between B-105 (terminal No. 2) starter relay connector and B-60 (terminal No. 2) clutch switch connector.



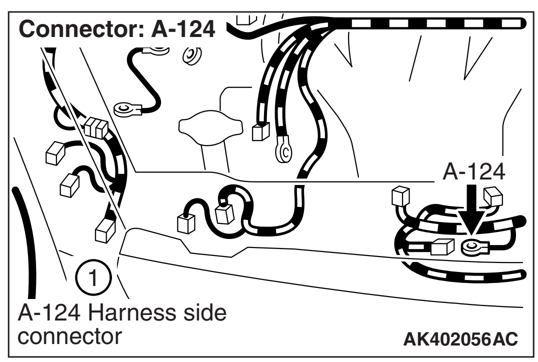


NOTE: Before checking harness, check intermediate connector B-112, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?
YES : Replace engine-ECU.
NO : Repair.

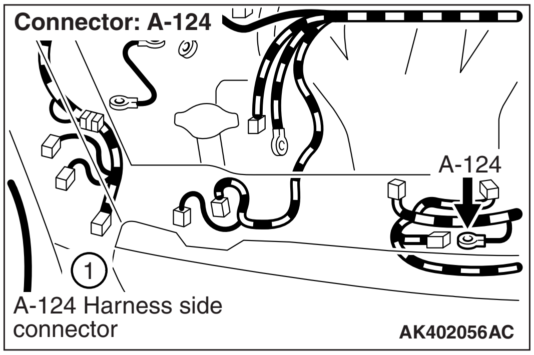
STEP 17. Connector check: A-124 starter connector



Q: Is the check result normal?
YES : Go to Step 18 .
NO : Repair or replace.

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Group TOC

STEP 18. Perform voltage measurement at A-124 starter connector.



- Disconnect connector, and measure at the harness side.
- Voltage between terminal No. 1 and earth.

OK: System voltage

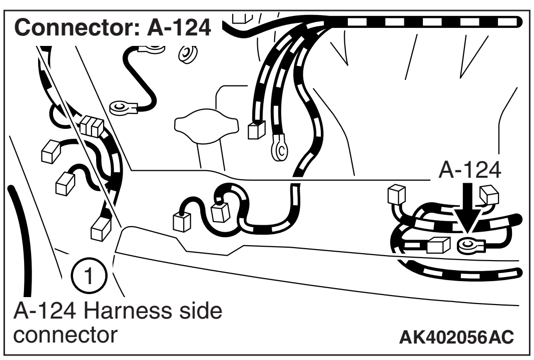
Q: Is the check result normal?

YES : Go to Step 19 .

NO : Check and repair harness between battery and A-124 (terminal No.1) starter connector.

- Check power supply line for open/short circuit.

STEP 19. Check harness between battery and A-124 (terminal No. 1) starter connector.

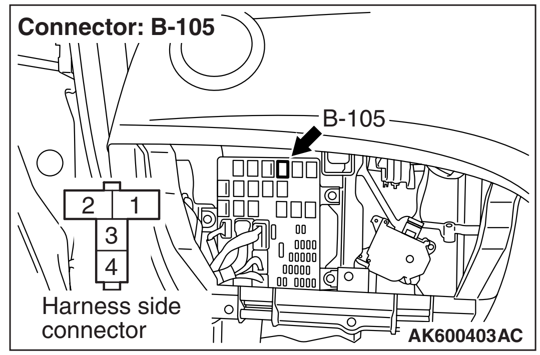


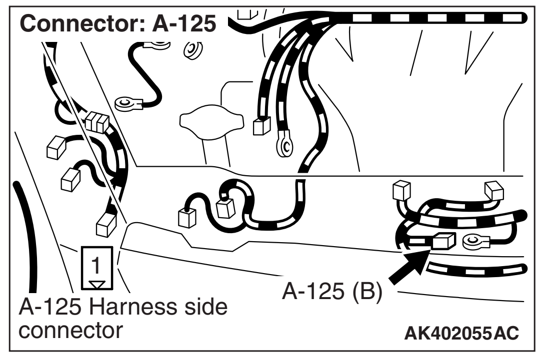
Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20. Check harness between B-105 (terminal No. 4) starter relay connector and A-125 (terminal No. 1) starter connector.





NOTE: Before checking harness, check intermediate connectors B-109 and A-17, and repair if necessary.

- Check output line for open circuit and damage.

Q: Is the check result normal?

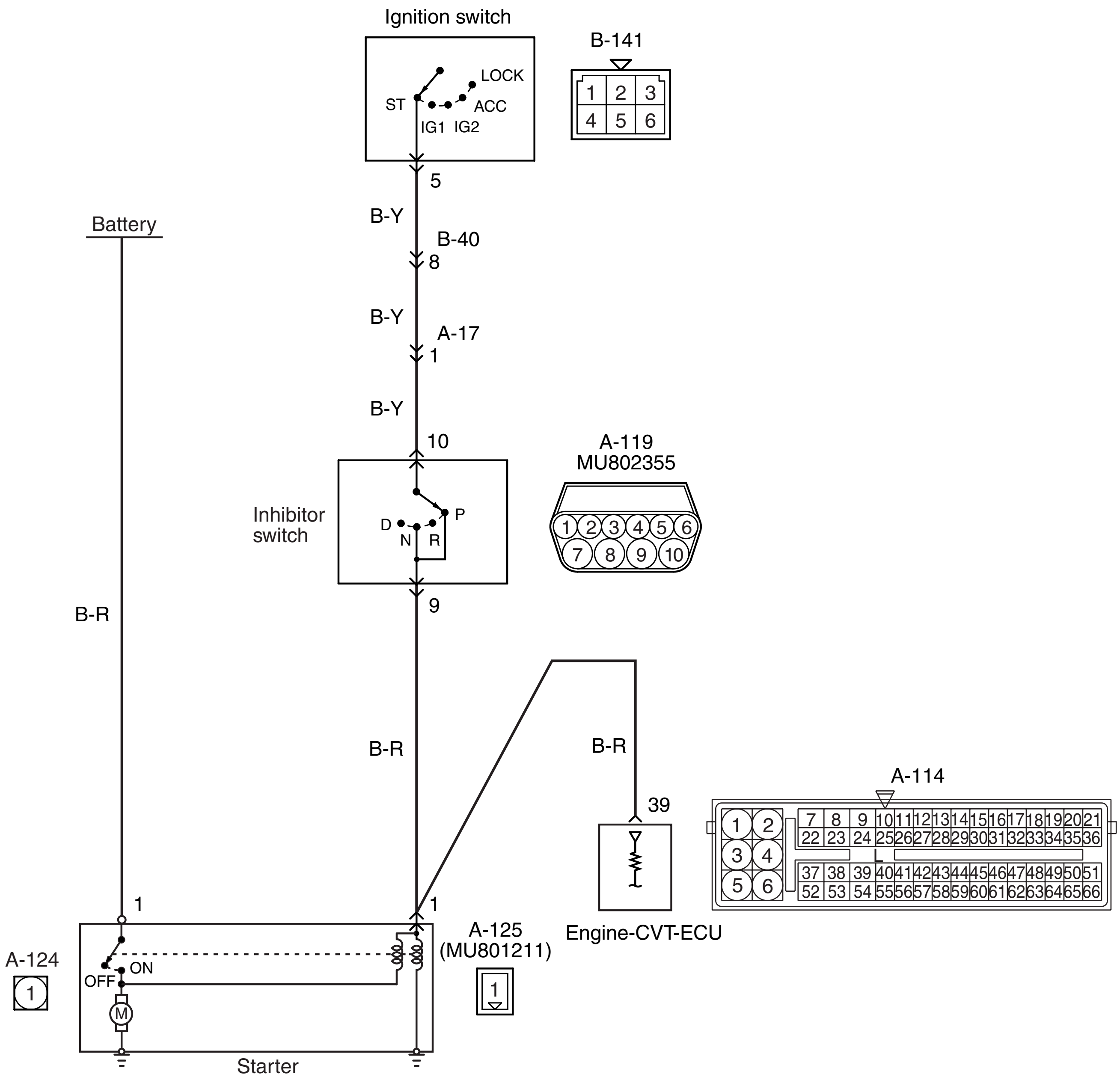
YES : Replace starter.

NO : Repair.

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Group TOC

Inspection Procedure 5: Starting impossible (No initial combustion) <CVT>

Starting Impossible (No Initial Combustion)



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet

AK402701AB

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed starter itself or failed related circuit.

PROBABLE CAUSES

- Failed battery
- Failed inhibitor switch
- Failed starter motor
- Open/short/damaged circuit in starter associated circuit or loose connector contact
- Failed ignition switch

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Group TOC

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test P.54A-5).

STEP 2. M.U.T.-III data list

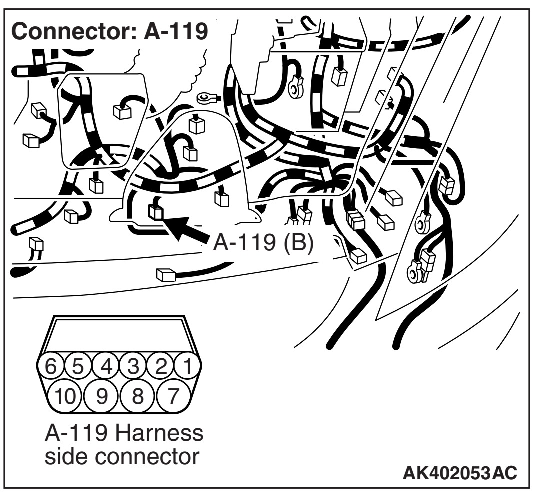
- Item 18: Cranking signal

OK:
ON (Ignition switch: ST)
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 11 .
NO : Go to Step 3 .

STEP 3. Connector check: A-119 inhibitor switch connector



Q: Is the check result normal?

YES : Go to Step 4 .
NO : Repair or replace the connector.

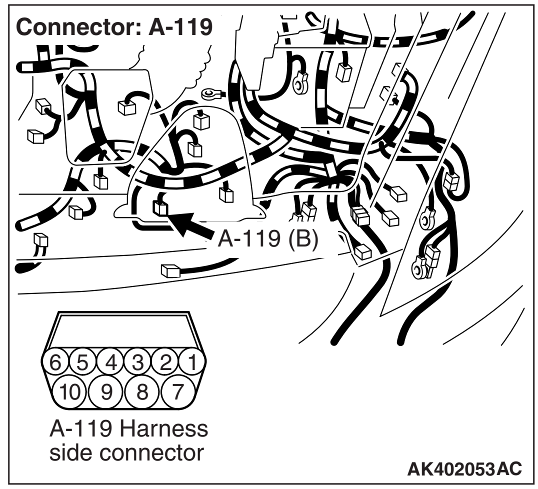
STEP 4. Check inhibitor switch.

- Check ignition switch (Refer to GROUP 23A – On-vehicle Service – CVT Control Component Checks – Inhibitor Switch Continuity Check P.23A-135).

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Replace ignition switch.

STEP 5. Perform voltage measurement at A-119 inhibitor switch connector



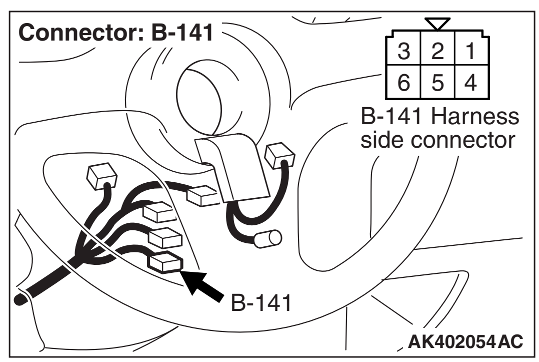
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 10 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .
NO : Go to Step 6 .

STEP 6. Connector check: B-141 ignition switch connector

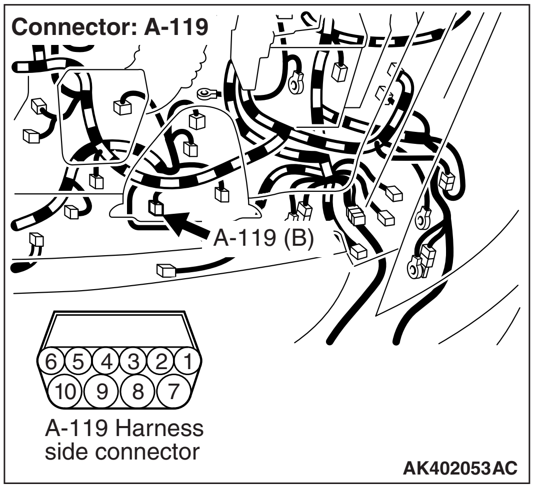


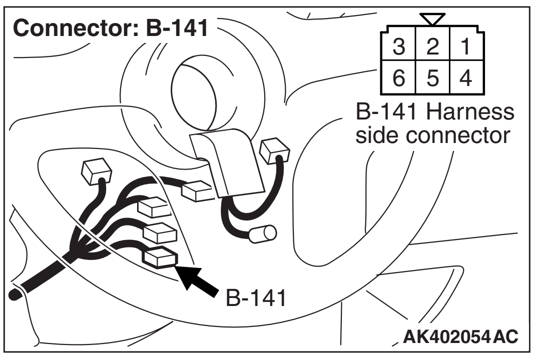
Q: Is the check result normal?

YES : Go to Step 7 .
NO : Repair or replace the connector.

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Group TOC

STEP 7. Check ignition switch





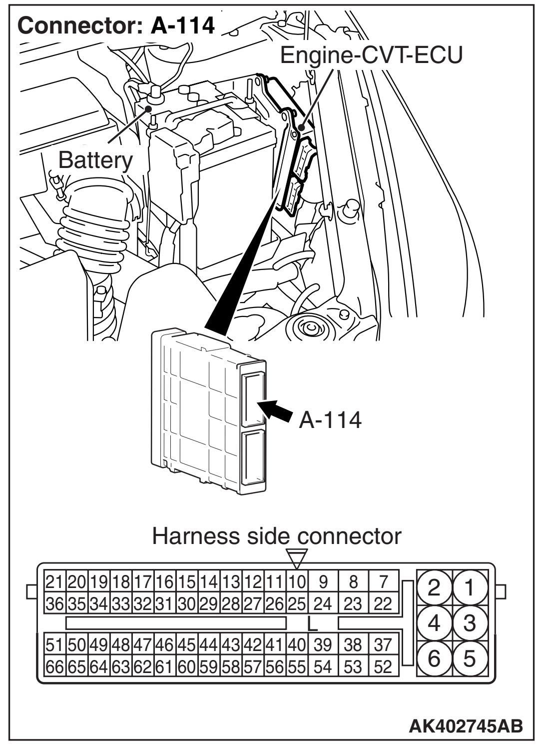
- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Inspection P.54A-27).

Q: Is the check result normal?

YES : Check intermediate connector A-17, B-40 and repair if necessary. If intermediate connector is normal, check and repair harness between A-119 (terminal No. 10) inhibitor switch connector and B-141 (terminal No. 5) ignition switch connector.
- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 8. Connector check: A-114 engine-CVT-ECU connector



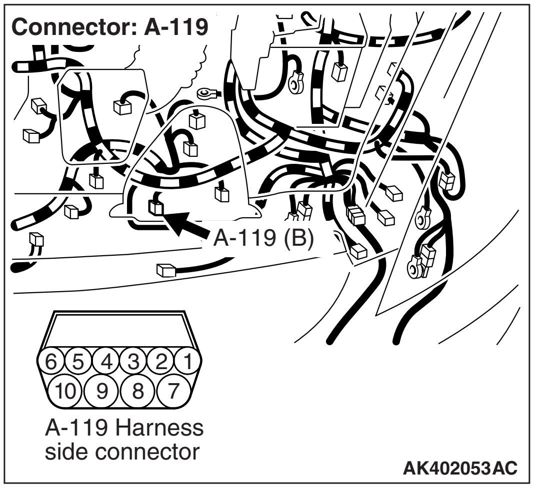
Q: Is the check result normal?

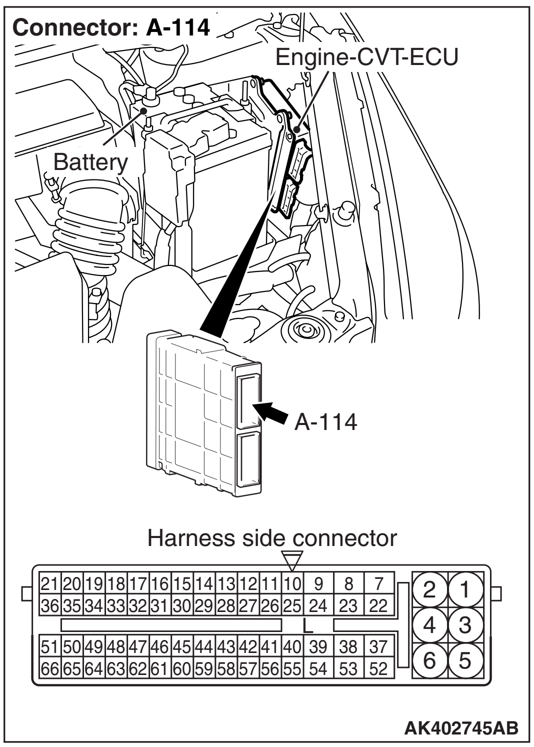
YES : Go to Step 9 .

NO : Repair or replace the connector.

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STEP 9. Check harness between A-119 (terminal No. 9) inhibitor switch connector and A-114 (terminal No. 39) engine-CVT-ECU connector.

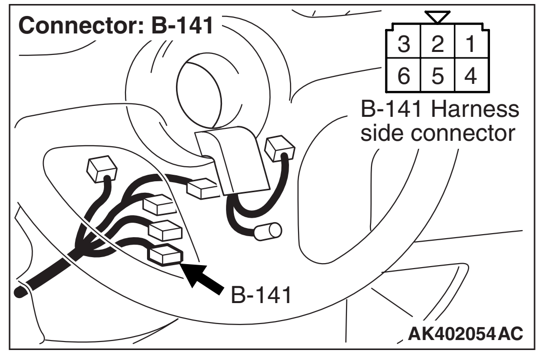


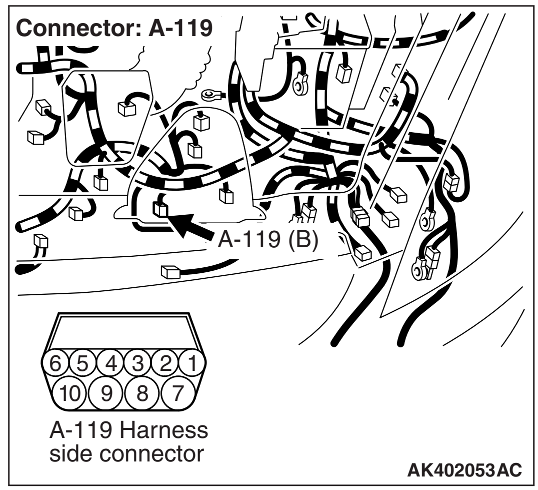


- Check output line for open/short circuit and damage.

Q: Is the check result normal?
YES : Go to Step 10 .
NO : Repair the damaged harness wire.

STEP 10. Connector check: B-141 ignition switch connector

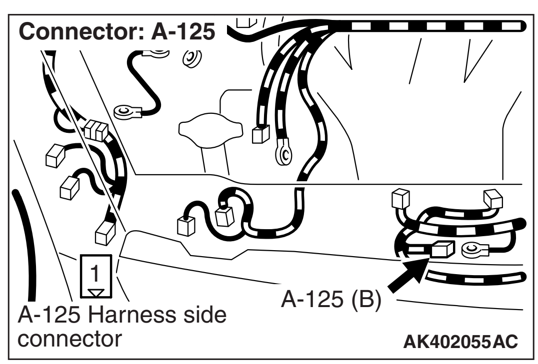




Q: Is the check result normal?
YES : Check intermediate connectors A-17, B-40, and repair if necessary. If intermediate connector is normal, check and repair harness between A-119 (terminal No. 10) inhibitor switch connector and B-141 (terminal No. 5) ignition switch connector.
- Check output line for damage.

NO : Repair or replace the connector.

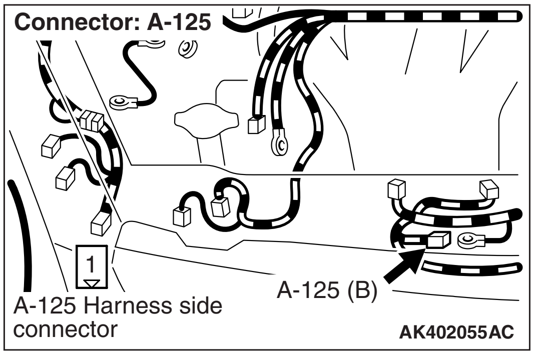
STEP 11. Connector check: A-125 starter connector

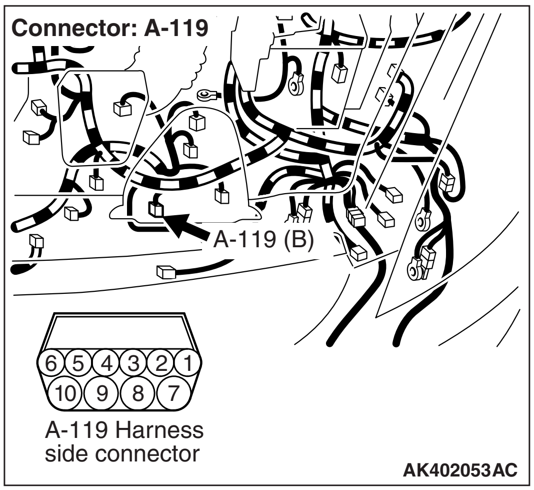


Q: Is the check result normal?
YES : Go to Step 12 .
NO : Repair or replace the connector.

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Group TOC

STEP 12. Perform voltage measurement at A-125 starter connector.





- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1 and earth.

OK: System voltage (Selector lever: P or N)
1 V or less (Selector lever: D, Ds, L or R)

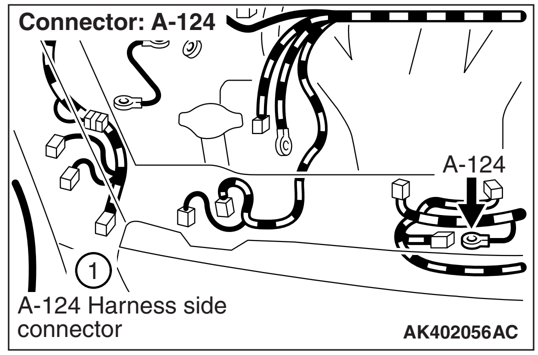
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Check harness between A-119 (terminal No. 9) inhibitor switch connector and A-125 (terminal No. 1) starter connector.

- Check power supply line for short circuit.

STEP 13. Connector check: A-124 starter connector

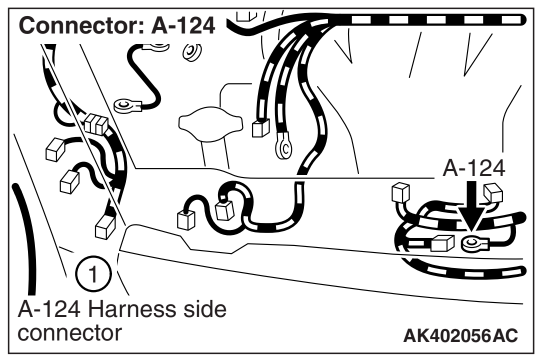


Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair or replace the connector.

STEP 14. Perform voltage measurement at A-124 starter connector.



- Disconnect connector, and measure at the harness side.
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

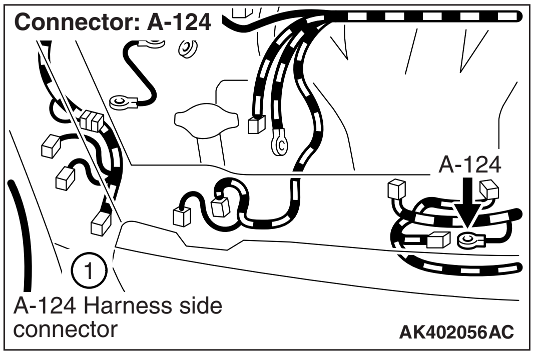
YES : Go to Step 15 .

NO : Check and repair harness between A-124 (terminal No. 1) starter connector and battery.

- Check power supply line for open/short circuit.

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Group TOC

STEP 15. Check harness between A-124 (terminal No. 1) starter connector and battery.



- Check power supply line for damage.

Q: Is the check result normal?
YES : Replace starter.
NO : Repair the damaged harness wire.

Inspection Procedure 6: Starting impossible (Starter operative but no initial combustion)

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition circuit, failed fuel feed or other faults.

PROBABLE CAUSES

- Failed battery
- Timing chain broken
- Throttle valve fouled around
- Failed ignition system
- Failed fuel system
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test P.54A-5).

STEP 2. With M.U.T.-III of communication.

- Confirm the communication available M.U.T. -III and engine-ECU <M/T> or engine-CVT-ECU <CVT>.

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Check engine-ECU <M/T> or engine-CVT-ECU <CVT> power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 P.13A-281).

STEP 3. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?
YES : Inspection chart for diagnosis codes (Refer to P.13A-20)
NO : Go to Step 4 .

STEP 4. M.U.T.-III actuator test

- Item 07: Fuel pump

OK: Operating sound of fuel pump can be heard.

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Check fuel pump system (Refer to Inspection Procedure 24 P.13A-289)

Main Index
Group TOC

STEP 5. Check timing chain for breakage.

- Engine: Cranking

OK: Camshaft rotates.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Replace timing chain.

STEP 6. Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 7 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

STEP 7. M.U.T.-III data list

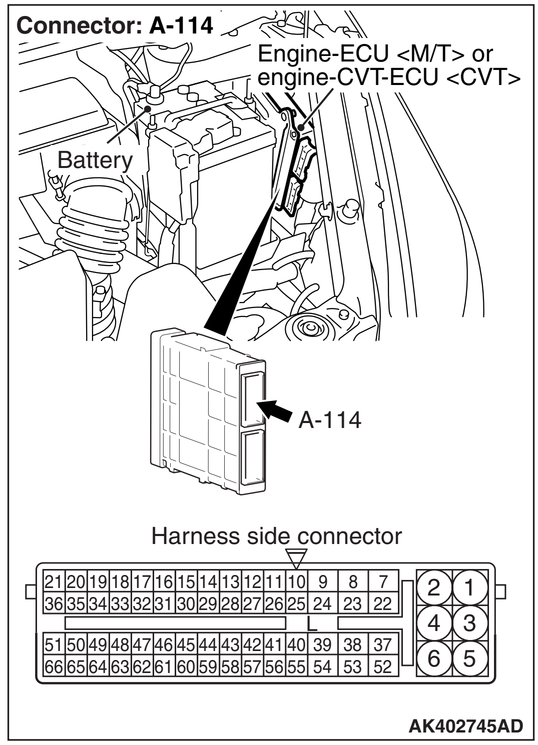
- Item 18: Cranking signal

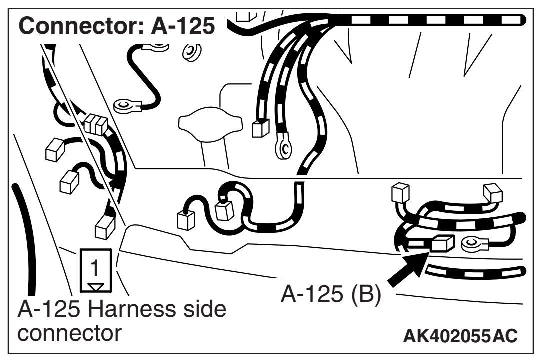
OK:
ON (Ignition switch: ST)
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 9 .
NO : Go to Step 8 .

STEP 8. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





Q: Is the check result normal?

YES : Check and repair harness between A-125 (terminal No. 1) inhibitor switch connector and A-114 (terminal No. 39) engine-ECU connector or engine-CVT-ECU connector.
- Check output line for open circuit and damage.

NO : Repair or replace the connector.

STEP 9. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 22: Crank angle sensor

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Check crank angle sensor system (Refer to Code No. P0335 P.13A-134).

Main Index
Group TOC

STEP 10. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark

Q: Is the check result normal?

YES : Go to Step 12 .
NO : Go to Step 11 .

STEP 11. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320)
NO : Replace spark plug.

STEP 12. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13A-364).

Q: Can operating sound be heard?

YES : Go to Step 13 .
NO : Check the injector system of the defective cylinder.
(Refer to Code No. P0201: No. 1 injector system P.13A-89).
(Refer to Code No. P0202: No. 2 injector system P.13A-94).
(Refer to Code No. P0203: No. 3 injector system P.13A-99).
(Refer to Code No. P0204: No. 4 injector system P.13A-104).

STEP 13. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Go to Step 14 .
NO : Repair.

STEP 14. Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>

- After replacing the engine-ECU <M/T> or engine-CVT-ECU <CVT>, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.
NO : Check end.

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Group TOC

Inspection Procedure 7: Starting impossible (Initial combustion but no complete combustion), starting impossible (Long time to start)

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by poor ignition, incorrect air-fuel ratio at cranking, improper fuel pressure or other faults.

PROBABLE CAUSES

- Failed battery
- Failed ignition system
- Failed fuel system
- Failed air-fuel ratio control system
- Failed intake/exhaust system
- Failed exhaust gas cleaning system
- Throttle valve fouled around
- Timing chain not in place
- Compression pressure improper
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check battery condition.

Q: Have the battery terminal been disconnected?

YES : Carry out the learning procedure for the idling (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – Learning Procedure for Idling in MPI Engine P.00-21).

NO : Go to Step 2 .

STEP 2. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test P.54A-5).

STEP 3. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to P.13A-20)

NO : Go to Step 4 .

STEP 4. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 13: Intake air temperature sensor
  b. Item 21: Engine coolant temperature sensor
  c. Item 25: Barometric pressure sensor
  d. Item 32: Manifold absolute pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 5. Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

STEP 6. M.U.T.-III actuator test

- Item 07: Fuel pump

OK: Operating sound of fuel pump can be heard.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Check fuel pump system (Refer to Inspection Procedure 24 P.13A-289).

STEP 7. Check air intake from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

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Group TOC

STEP 8. Check injector for operating sound.

- Check injector for operating sound at engine cranking (Refer to P.13A-364).

Q: Can operating sound be heard?

YES : Go to Step 9 .
NO : Check the injector system of the defective cylinder.
(Refer to Code No. P0201: No.1 Injector System P.13A-89).
(Refer to Code No. P0202: No.2 Injector System P.13A-94).
(Refer to Code No. P0203: No.3 Injector System P.13A-99).
(Refer to Code No. P0204: No.4 Injector System P.13A-104).

STEP 9. Check timing marks of timing chain.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Align timing marks.

STEP 10. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 12 .
NO : Go to Step 11 .

STEP 11. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320)
NO : Replace spark plug.

STEP 12. Check spray condition of injector.

- Check each injector for spray condition (Refer to P.13A-364).

Q: Is the check result normal?

YES : Go to Step 13 .
NO : Replace injector.

STEP 13. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Go to Step 14 .
NO : Repair.

STEP 14. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check P.11A-12).

Q: Is the check result normal?

YES : Go to Step 15 <CVT> , go to Step 16 <M/T> .
NO : Repair.

STEP 15. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check P.17-20].

Q: Is the check result normal?

YES : Go to Step 16 .
NO : Replace EGR valve (stepper motor).

STEP 16. Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

- After replacing the engine-ECU <M/T> or engine-CVT-ECU <CVT>, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.
NO : Check end.

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Group TOC

Inspection Procedure 8: Unstable idling (Rough idling, Hunting), improper idling speed (Too high or too low), engine stalls during idling (Die out)

COMMENT ON TROUBLE SYMPTOM

- Probable causes can be widely found in ignition system, air-fuel ratio control system, idle air control fuel system, etc. A sudden engine stall is possibly caused by poor connector contact.

PROBABLE CAUSES

- Failed ignition system
- Failed fuel system
- Failed air-fuel ratio control system
- Failed intake/exhaust system
- Failed exhaust gas cleaning system
- Throttle valve fouled around
- Timing chain out of place
- Compression pressure improper
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check battery condition.

Q: Has the battery terminal been disconnected?

YES : Carry out the learning procedure for the idling (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – Learning Procedure for Idling in MPI Engine P.00-21).

NO : Go to Step 2 .

STEP 2. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 3 .

STEP 3. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 13: Intake air temperature sensor
  b. Item 14: Throttle position sensor (sub)
  c. Item 21: Engine coolant temperature sensor
  d. Item 25: Barometric pressure sensor
  e. Item 32: Manifold absolute pressure sensor
  f. Item 77: Accelerator pedal position sensor (sub)
  g. Item 78: Accelerator pedal position sensor (main)
  h. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 4 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 4. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 29: Inhibitor switch
  b. Item 67: Stop lamp switch

Q: Are the check results normal?

YES : Go to Step 5 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 5. Check air intake from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check timing marks of timing chain.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Align timing marks.

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Group TOC

STEP 7. Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 8 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

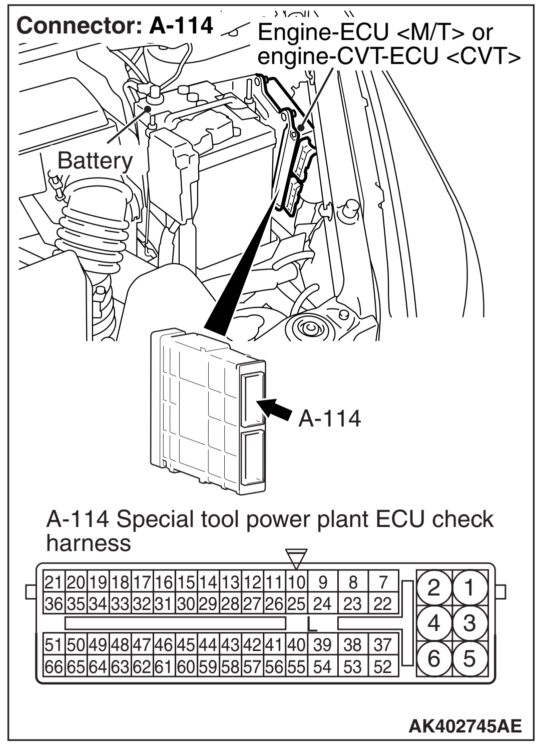
STEP 8. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  - a. Item 11: Oxygen sensor (front)
  - b. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?

YES : Go to Step 9 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 9. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect Special Tool Power Plant ECU Check Harness (MB991987), and then measure the voltage on the check connector.
- Engine: Idling after warm-up
- Transmission: P range
- Radiator fan: Not operating
- Voltage between terminal No. 64 and earth.

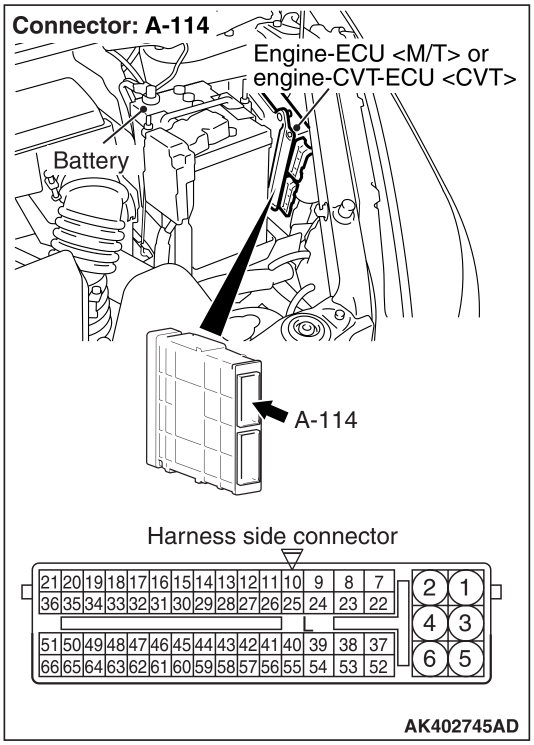
OK: Switching the headlamps to ON from OFF causes the voltage to increase 0.2 − 3.5 V.

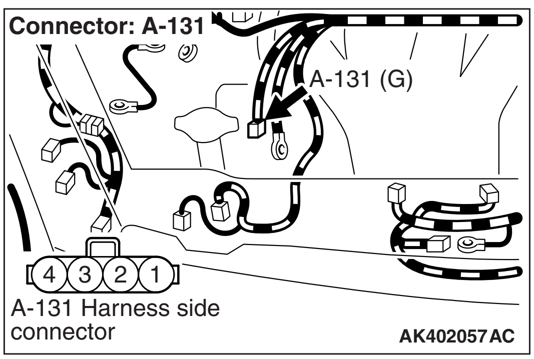
Q: Is the check result normal?

YES : Go to Step 13 .
NO : Go to Step 10 .

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STEP 10. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector and A-131 alternator connector



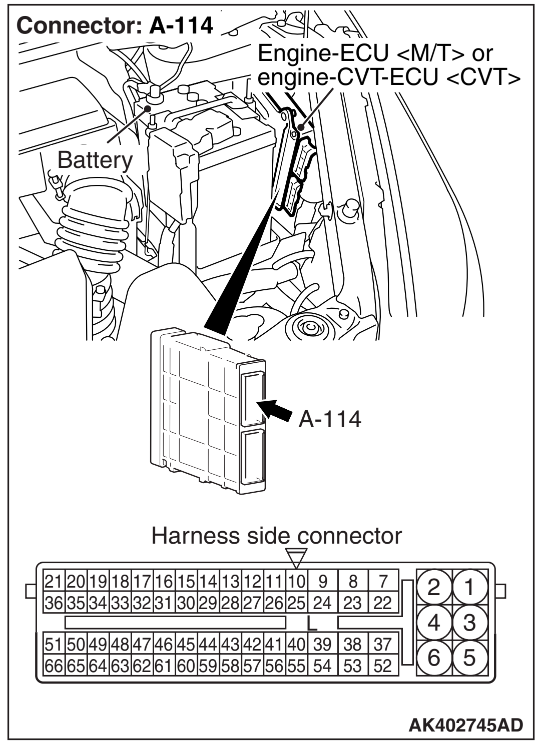


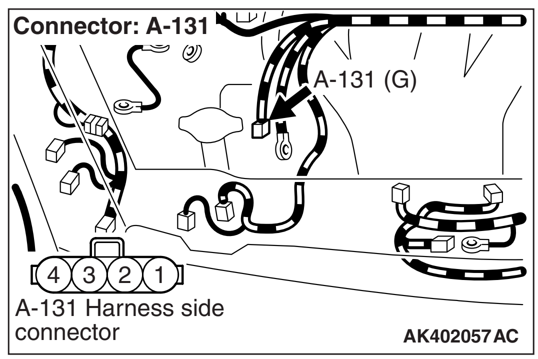
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair or replace the connector.

STEP 11. Check harness between A-114 (terminal No. 64) engine-ECU connector or engine-CVT-ECU connector and A-131 (terminal No. 1) alternator connector.





- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair the damaged harness wire.

STEP 12. Check the trouble symptom.

Q: Does trouble symptom persist?

YES : Replace alternator.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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STEP 13. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 15 .
NO : Go to Step 14 .

STEP 14. Check spark plug.

- Check spark plug (Refer to GROUP 16 − Ignition System − On-vehicle Service − Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320)
NO : Replace spark plug.

STEP 15. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 − Emission Control System − Evaporative Emission Control System − Purge Control Solenoid Valve Check P.17-16)

Q: Is the check result normal?

YES : Go to Step 16 <CVT> , go to Step 17 <M/T> .
NO : Replace purge control solenoid valve.

STEP 16. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 − Emission Control System − Exhaust Gas Recirculation (EGR) System − EGR Valve (Stepper Motor) Check P.17-20].

Q: Is the check result normal?

YES : Go to Step 17 .
NO : Replace EGR valve (stepper motor).

STEP 17. Check injector for spray condition.

- Check each injector for spray condition (Refer to P.13A-364).

Q: Is the check result normal?

YES : Go to Step 18 .
NO : Replace injector.

STEP 18. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A − On-vehicle Service − Compression Pressure Check P.11A-12).

Q: Is the check result normal?

YES : Go to Step 19 .
NO : Repair.

STEP 19. Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

- After engine-ECU <M/T> or engine-CVT-ECU <CVT> is replaced, re-check for trouble symptom.

Q: Does trouble system persist?

YES : Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.
NO : Check end.

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Inspection Procedure 9: The engine stalls when starting the car (Pass out)

COMMENT ON TROUBLE SYMPTOM

- Engine stall on starting is possibly caused by misfire due to failed spark plug, improper air-fuel ratio at accelerator pedal depression or other faults.

PROBABLE CAUSES

- Failed ignition system
- Failed intake system
- Failed exhaust gas cleaning system
- Air drawn in from gaps in gasket, seals, etc.
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)
  b. Item 77: Accelerator pedal position sensor (sub)
  c. Item 78: Accelerator pedal position sensor (main)
  d. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Check air intake from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Repair.

STEP 4. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 6 <CVT> , replace engine-ECU <M/T>.
NO : Go to Step 5 .

STEP 5. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320)
NO : Replace spark plug.

STEP 6. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check P.17-20].

Q: Is the check result normal?

YES : Replace engine-CVT-ECU.
NO : Replace EGR valve (stepper motor).

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Inspection Procedure 10: The engine stalls when decelerating

COMMENT ON TROUBLE SYMPTOM

- Engine stall on deceleration is possibly caused by insufficient air intake, improper air-fuel ratio due to failed exhaust gas recirculation (EGR) system <CVT> or other faults.

PROBABLE CAUSES

- Failed electronically controlled throttle valve system
- Failed ignition system
- Failed emission control system
- Throttle valve fouled around
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)
  b. Item 77: Accelerator pedal position sensor (sub)
  c. Item 78: Accelerator pedal position sensor (main)
  d. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

STEP 4. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 6 <CVT> , Replace engine-ECU <M/T>.
NO : Go to Step 5 .

STEP 5. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).
NO : Replace spark plug.

STEP 6. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check P.17-20].

Q: Is the check result normal?

YES : Replace engine-CVT-ECU.
NO : Replace EGR valve (stepper motor).

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Inspection Procedure 11: Engine does not revolve up

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed fuel system, electronically controlled throttle valve system ignition system or other faults.

PROBABLE CAUSES

- Failed ignition system
- Failed fuel system
- Failed electronically controlled throttle valve system
- Timing chain not in place
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)
  b. Item 77: Accelerator pedal position sensor (sub)
  c. Item 78: Accelerator pedal position sensor (main)
  d. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Check timing marks of timing chain.

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Align timing marks.

STEP 4. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Go to Step 5 .

STEP 5. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).
NO : Replace spark plug.

STEP 6. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Repair.

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Inspection Procedure 12: Hesitation, sag, poor acceleration, stumble, surge

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition system, improper air-fuel ratio, improper compression pressure or other faults.

PROBABLE CAUSES

- Failed air-fuel ratio control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed exhaust gas cleaning system
- Failed electronically controlled throttle valve system
- Throttle valve fouled around
- Improper compression pressure
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13A-364).

Q: Can operating sound be heard?

YES : Go to Step 3 .
NO : Check the injector system of the defective cylinder.
(Refer to Code No. P0201: No. 1 Injector System P.13A-89).
(Refer to Code No. P0202: No. 2 Injector System P.13A-94).
(Refer to Code No. P0203: No. 3 Injector System P.13A-99).
(Refer to Code No. P0204: No. 4 Injector System P.13A-104).

STEP 3. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 13: Intake air temperature sensor
  b. Item 14: Throttle position sensor (sub)
  c. Item 21: Engine coolant temperature sensor
  d. Item 77: Accelerator pedal position sensor (sub)
  e. Item 78: Accelerator pedal position sensor (main)
  f. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 4 .
NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 4. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System – Purge Control Solenoid Valve Check P.17-16).

Q: Is the check result normal?

YES : Go to Step 5 <CVT> , go to Step 6 <M/T> .
NO : Replace purge control solenoid valve.

STEP 5. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check P.17-20].

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Replace EGR valve (stepper motor).

STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 11: Oxygen sensor (front)
  b. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?

YES : Go to Step 7 .
NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

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STEP 7. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 9 .
NO : Go to Step 8 .

STEP 8. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).
NO : Replace spark plug.

STEP 9. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

STEP 10. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check P.11A-12).

Q: Is the check result normal?

YES : Go to Step 11 .
NO : Repair.

STEP 11. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Repair.

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Inspection Procedure 13: The feeling of impact or vibration when accelerating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition leak with rise in spark plug-required voltage at acceleration, electronically controlled throttle valve system soon.

PROBABLE CAUSES

- Failed ignition system
- Failed electronically controlled throttle valve system
- Throttle valve fouled around
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)
  b. Item 77: Accelerator pedal position sensor (sub)
  c. Item 78: Accelerator pedal position sensor (main)
  d. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

STEP 4. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Go to Step 5 .

STEP 5. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).
NO : Replace spark plug.

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Inspection Procedure 14: The feeling of impact or vibration when decelerating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by insufficient air intake due to failed electronically controlled system.

PROBABLE CAUSES

- Failed electronically controlled system
- Throttle valve fouled around
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 14: Throttle position sensor (sub)
  b. Item 77: Accelerator pedal position sensor (sub)
  c. Item 78: Accelerator pedal position sensor (main)
  d. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 3 .

NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 3. Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

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Inspection Procedure 15: Knocking

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed detonation control, improper thermal value of spark plug or other faults.

PROBABLE CAUSES

- Defective detonation sensor
- Failed detonation control system
- Failed ignition system
- Defective spark plug
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 2 .

STEP 2. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connector.
- At the engine start, check each spark plug produces a spark

Q: Is the check result normal?

YES : Check detonation sensor system (Refer to Inspection Code No. P0325 P.13A-130).

NO : Go to Step 3 .

STEP 3. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 28 P.13A-320).

NO : Replace spark plug.

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Inspection Procedure 16: Ignition timing offset

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed crank angle sensor, failed camshaft position sensor, improper installed timing belt or other faults.

PROBABLE CAUSES

- Failed crank angle sensor
- Failed camshaft position sensor
- Improperly installed timing belt
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

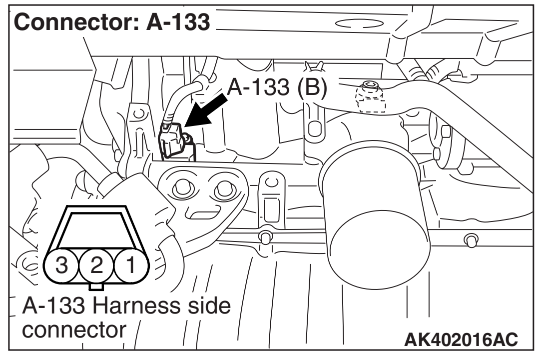
STEP 1. M.U.T.-III diagnosis code

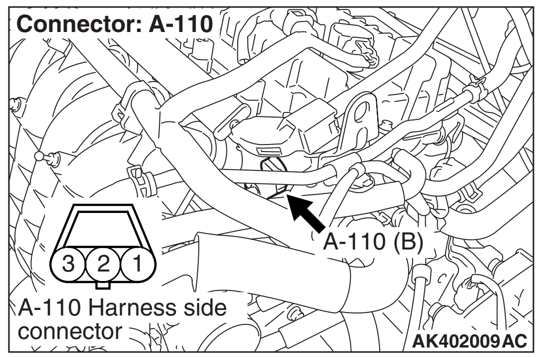
Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 2 .

STEP 2. Perform output wave pattern measurement of crank angle sensor and camshaft position sensor (Using an oscilloscope).





Crank Angle Sensor

- Use special tool test harness (MB991658) to connect A-133 crank angle sensor intermediate connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 2 and earth.

Camshaft Position Sensor

- Use special tool test harness (MB991709) to connect A-110 camshaft position sensor connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: P range
- Voltage between terminal No. 2 and earth.

OK: Output waveform timings of both sensors are the same as the check procedure (Refer to P.13A-348) using an oscilloscope.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Go to Step 4 .

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STEP 3. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

STEP 4. Check crank angle sensor and camshaft position sensor mounted conditions.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check timing marks of timing chain.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Align timing marks.

STEP 6. Check crank shaft sensing blead.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace crank shaft sensing blead.

STEP 7. Check camshaft position sensing cylinder.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Replace camshaft position sensing cylinder.

STEP 8. Replace crank angle sensor.

- After replacing the crank angle sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Go to Step 9 .

NO : Check end.

STEP 9. Replace camshaft position sensor.

- After replacing the camshaft position sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

Inspection Procedure 17: Run on (dieseling)

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by leakage from injector.

PROBABLE CAUSES

- Failed injector
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check injector for spray condition.

- Check each injector for spray condition (Refer to P.13A-364).

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Replace injector.

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Inspection Procedure 18: Odor, white smoke, black smoke, and high-concentration CO/HC during idling

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by improper air-fuel ratio, deteriorated catalyst, failed ignition system, failed fuel system, failed compression pressure or other faults.

PROBABLE CAUSES

- Failed air-fuel ratio control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed exhaust gas cleaning system
- Failed compression pressure
- Failed catalytic converter
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13A-364).

Q: Can operating sound be heard?

YES : Go to Step 3 .

NO : Check the injector system of the defective cylinder.

(Refer to, Code No. P0201: No. 1 injector system P.13A-89).

(Refer to, Code No. P0202: No. 2 injector system P.13A-94).

(Refer to, Code No. P0203: No. 3 injector system P.13A-99).

(Refer to, Code No. P0204: No. 4 injector system P.13A-104).

STEP 3. Check ignition timing.

- Check ignition timing (Refer to GROUP 11A – On-vehicle Service – Ignition Timing Check P.11A-9).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check for offset ignition timing (Refer to Inspection Procedure 16 P.13A-267).

STEP 4. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 13: Intake air temperature sensor
  b. Item 21: Engine coolant temperature sensor
  c. Item 25: Barometric pressure sensor
  d. Item 32: Manifold absolute pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 5. Check air intake from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check for emission leakage from exhaust manifold.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Clean throttle body (throttle valve portion) (Refer to P.13A-355).

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STEP 8. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 11: Oxygen sensor (front)
  b. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?

YES : Go to Step 9 .

NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-20).

STEP 9. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System – Purge Control Solenoid Valve Check P.17-16).

Q: Is the check result normal?

YES : Go to Step 10 <CVT> , go to Step 11 <M/T> .

NO : Replace purge control solenoid valve.

STEP 10. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check P.17-20].

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Replace EGR valve (stepper motor).

STEP 11. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-355).

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

STEP 12. Check positive crankcase ventilation valve itself.

- Check positive crankcase ventilation valve itself (Refer to GROUP 17 – Emission Control System – crankcase Emission Control System – Positive Crankcase Ventilation (PCV) Valve Check P.17-13).

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Replace positive crankcase ventilation valve.

STEP 13. Check spark plug.

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-35).

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Replace spark plug.

STEP 14. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check P.11A-12).

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15. Check injector for spraying condition.

- Check each injector for spray condition (Refer to P.13A-364).

Q: Does trouble symptom persist?

YES : Go to Step 16 .

NO : Replace injector.

STEP 16. Replace catalytic converter.

- After replacing the catalytic converter, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Check end

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Inspection Procedure 19: Battery run down

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed alternator, failed generation control circuit or other faults.

PROBABLE CAUSES

- Failed battery
- Alternator G terminal short-circuited
- Failed alternator
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage during cranking.

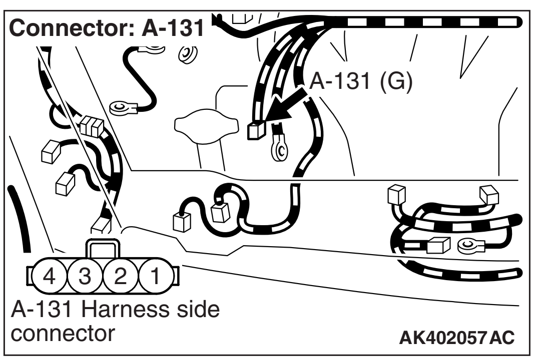
OK: 8 V or more

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test P.54A-5).

STEP 2. Connector check: A-131 alternator connector

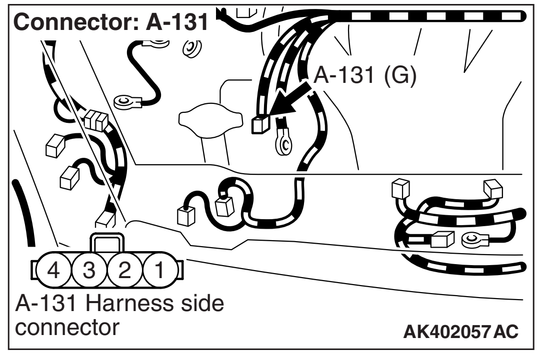


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at A-131 alternator connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

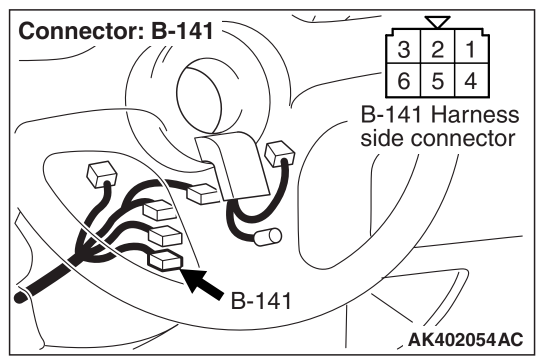
OK: System voltage

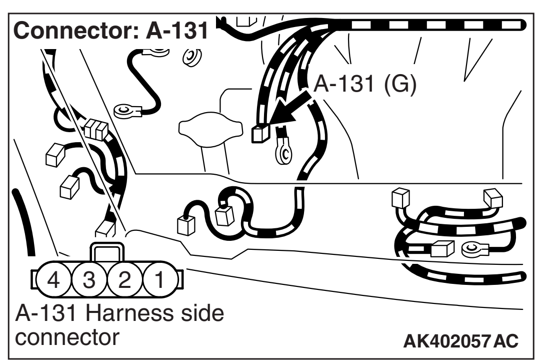
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: B-141 ignition switch connector





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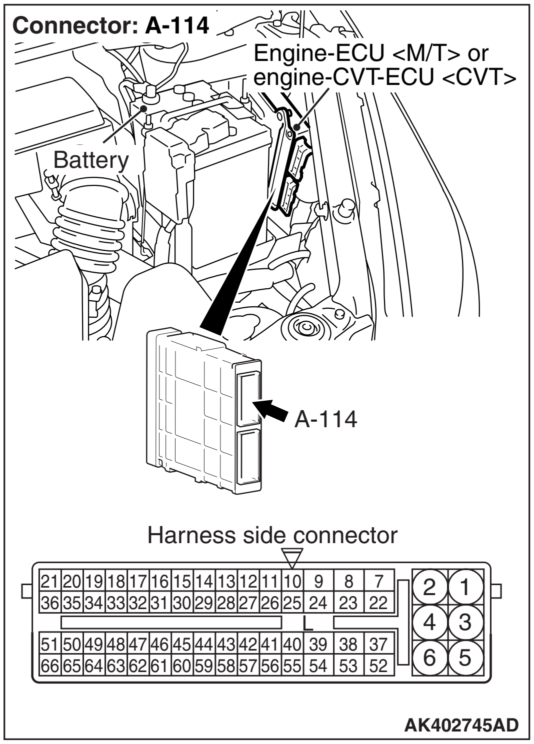
Q: Is the check result normal?

YES : Check intermediate connectors A-17, B-14, B-41, B-22, B-131, B-129, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-131 (terminal No. 3) alternator connector and B-141 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector

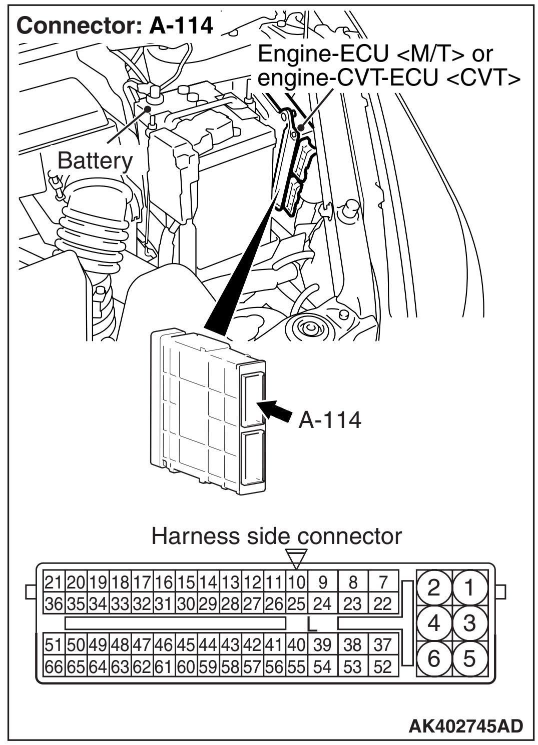


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 64 and earth.

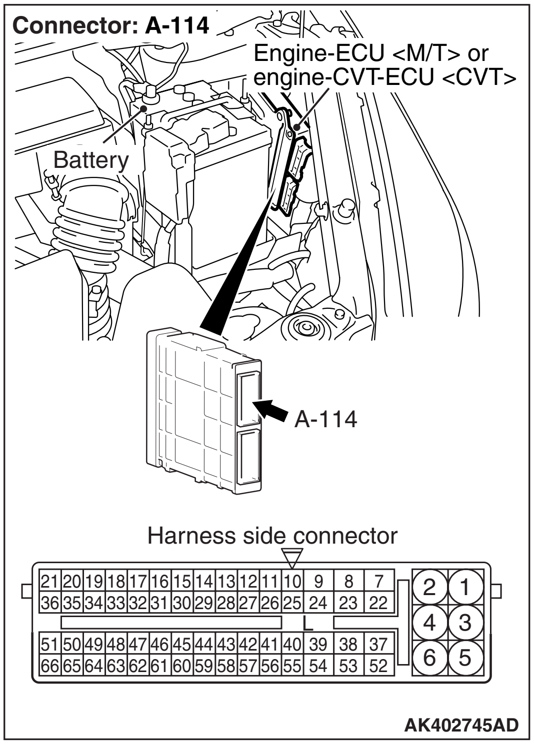
OK: System voltage

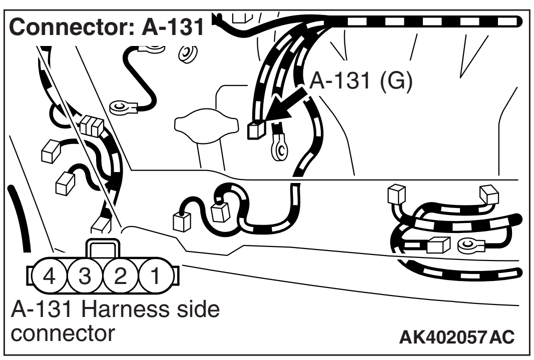
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Check harness between A-114 (terminal No. 64) engine-ECU connector or engine-CVT-ECU connector and A-131 (terminal No. 1) alternator connector.





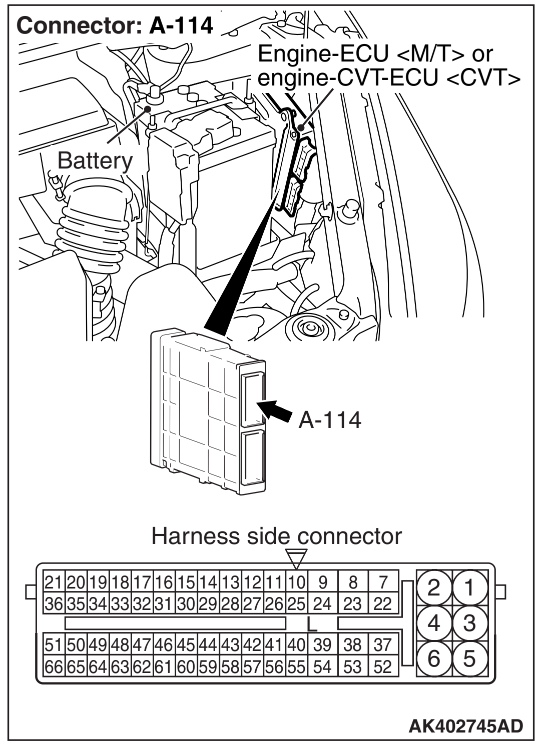
- Check output line for open/short circuit.

Q: Is the check result normal?

YES : Replace alternator.

NO : Repair the damaged harness wire.

STEP 8. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect Special Tool Power Plant ECU Check Harness (MB991987), and then measure the voltage on the check connector.
- Engine: Idling after warm-up
- Transmission: P range
- Radiator fan: Inactive
- Voltage between terminal No. 64 and earth.

OK: Switching the headlamps to ON from OFF causes the voltage to increase 0.2 – 3.5 V.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace alternator.

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Inspection Procedure 20: Overheating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed engine cooling system, failed fan controller, failed engine coolant temperature sensor or other faults.

PROBABLE CAUSES

- Insufficient or deteriorated engine coolant
- Failed cooling fan control relay
- Failed engine coolant temperature sensor
- Failed thermostat
- Failed water pump
- Failed radiator core
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. Check engine coolant.

NOTE: If engine coolant level falls too early, check for leaky spots, and repair if necessary.

- Check engine coolant (Refer to GROUP 14 – On-vehicle Service – Engine Coolant Leak Check P.14-3).

Q: Is the check result normal?

YES : Go to Step 3 .
NO : Replace or add engine coolant.

STEP 3. M.U.T.-III actuator test

- Refer to Actuator Test Reference Table P.13A-341.
  a. Item 20: Cooling fan motor

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Check fan control relay system (Refer to Inspection Procedure 25 P.13A-302).

STEP 4. M.U.T.-III data list

- Item 21: Engine coolant temperature sensor

OK:
Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.
Engine hot state: At 80 – 120°C

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Check engine coolant temperature sensor system (Refer to Code No. P0115 P.13A-42).

STEP 5. Check thermostat.

- Check thermostat (Refer to GROUP 14 – Thermostat – Thermostat Inspection P.14-12).

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Replace thermostat.

STEP 6. Check water pump.

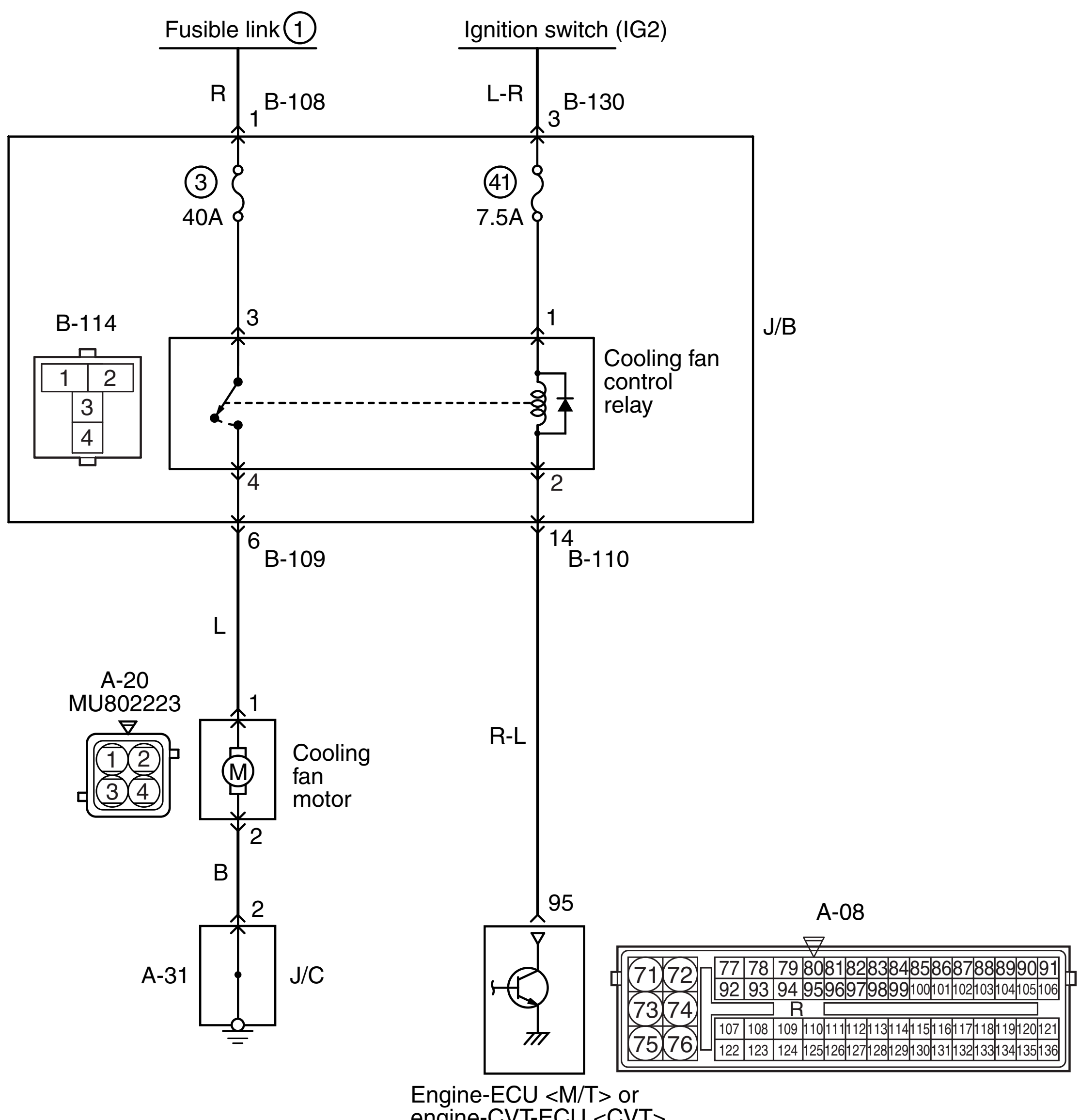
- Check water pump.

Q: Is the check result normal?

YES : Replace radiator.
NO : Replace water pump.

Inspection Procedure 21: Abnormal rotation of fan motor

Cooling Fan Control Relay Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

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OPERATION

- The battery voltage is applied to the cooling fan control relay coil (terminal No.1) from the ignition switch.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 95) turns on the switch of the power transistor on the unit, and then turns on the switch of the relay by applying the electrical current to the cooling fan control relay coil.
- When the cooling fan control relay is in ON position, the battery voltage is applied to the cooling fan motor (terminal No.1) from the cooling fan control relay (terminal No. 4).

FUNCTION

- When the cooling fan control relay is in ON position, the fan motor rotates with the low speed.

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PROBABLE CAUSES

- Failed cooling fan motor
- Open/short/damaged circuit in fan control relay circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check cooling fan motor.

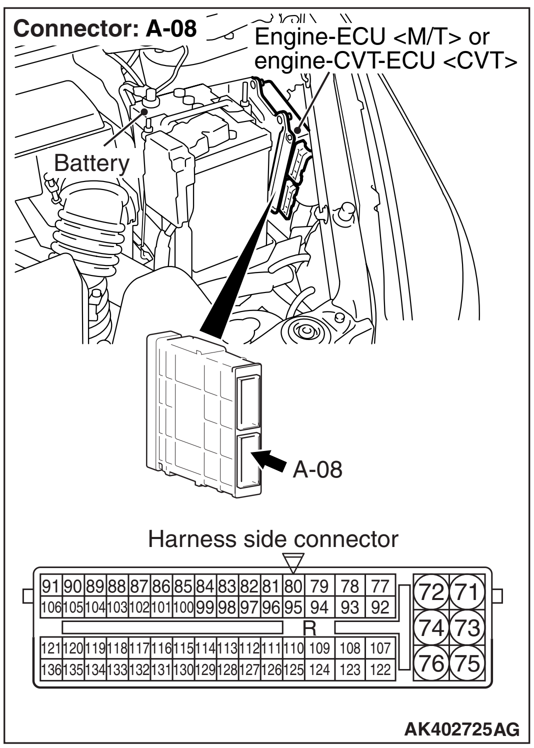
- Check cooling fan motor (Refer to GROUP 14 – On-vehicle Service – Cooling Fan Motor Check P.14-8).

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace cooling fan motor.

STEP 2. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

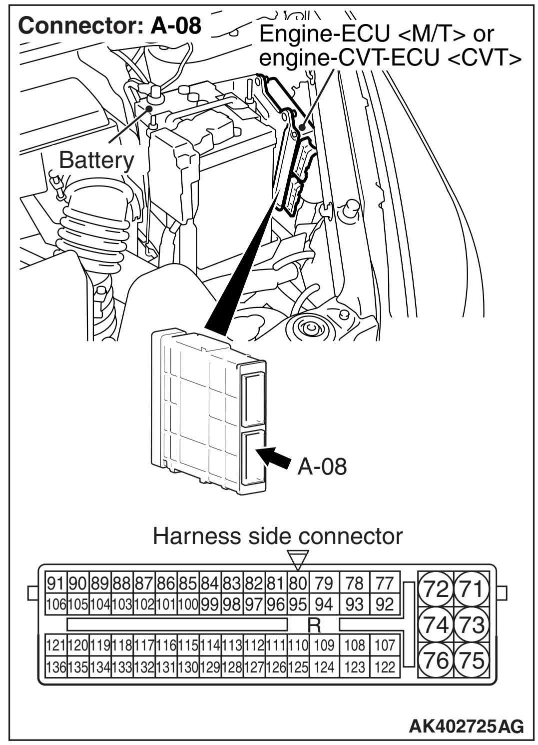


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 95 and earth.

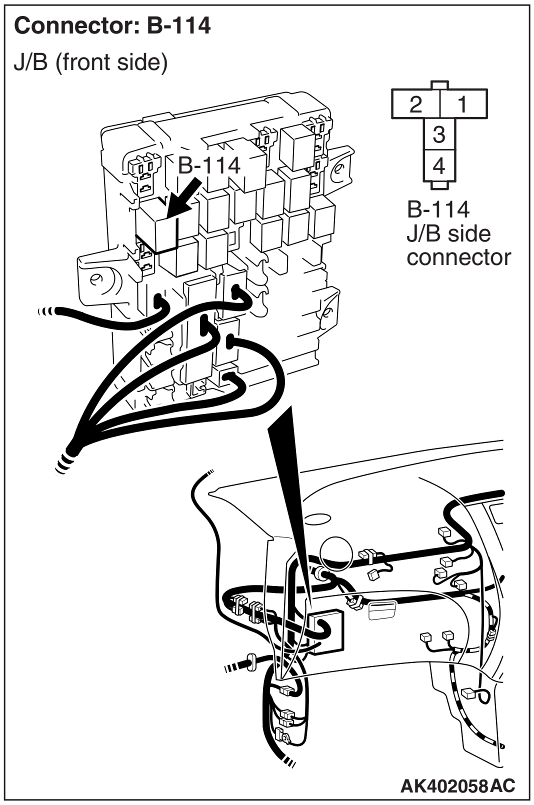
OK: System voltage

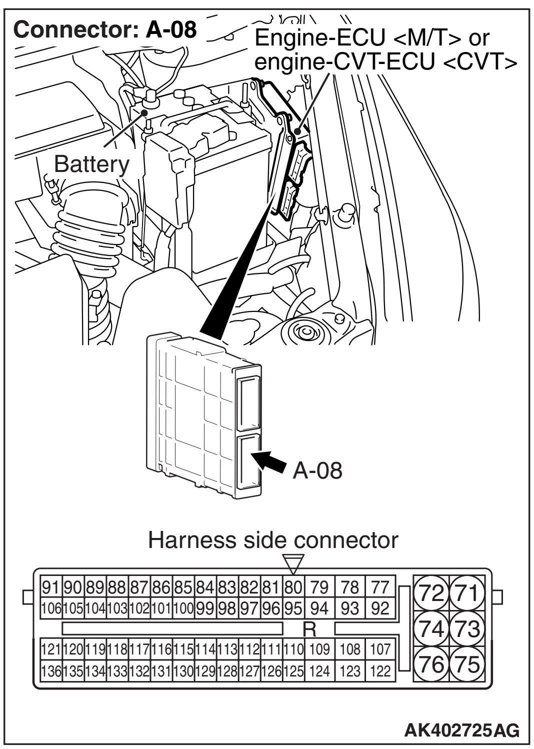
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: B-114 cooling fan control relay connector





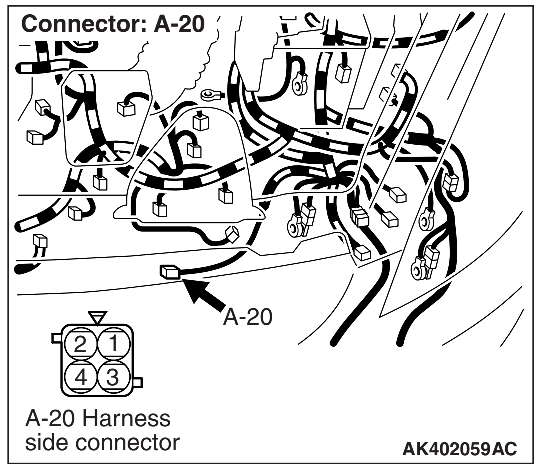
Q: Is the check result normal?

YES : Check intermediate connectors B-110, and repair if necessary. If intermediate connector is normal, check and repair harness between B-114 (terminal No. 2) cooling fan control relay connector and A-08 (terminal No. 95) engine-ECU connector or engine-CVT-ECU connector.

- Check signal line for short circuit.

NO : Repair or replace the connector.

STEP 5. Connector check: A-20 cooling fan motor

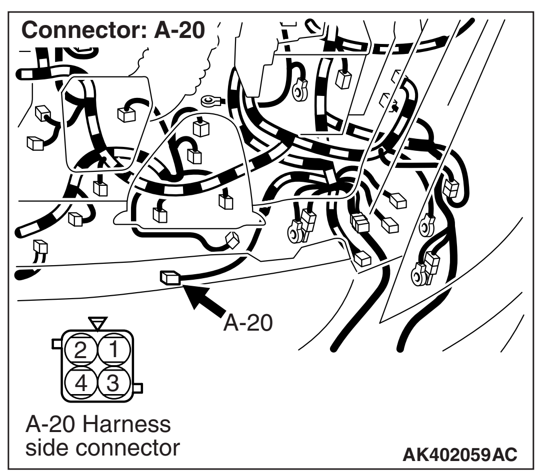


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

STEP 6. Perform resistance measurement at A-20 cooling fan motor connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

OK: Continuity (2 Ω or less)

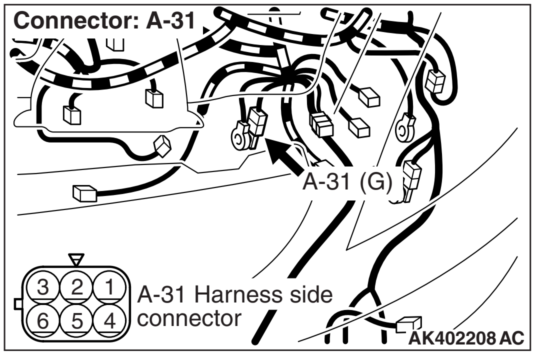
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7.

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STEP 7. Connector check: A-31 earth connector



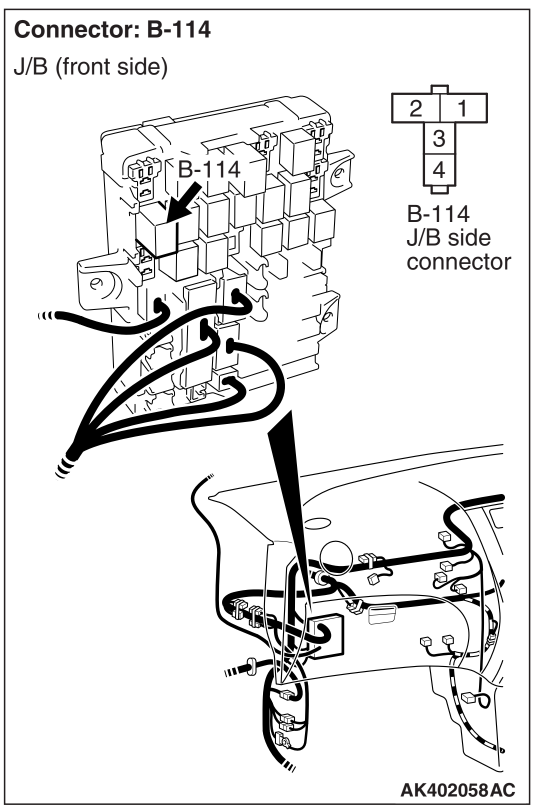
Q: Is the check result normal?

YES : Check and repair harness between A-20 (terminal No. 2) cooling fan motor connector and A-31 (terminal No. 2) earth connector.

- Check earthing line for damage.

NO : Repair or replace the connector.

STEP 8. Connector check: B-114 cooling fan control relay connector

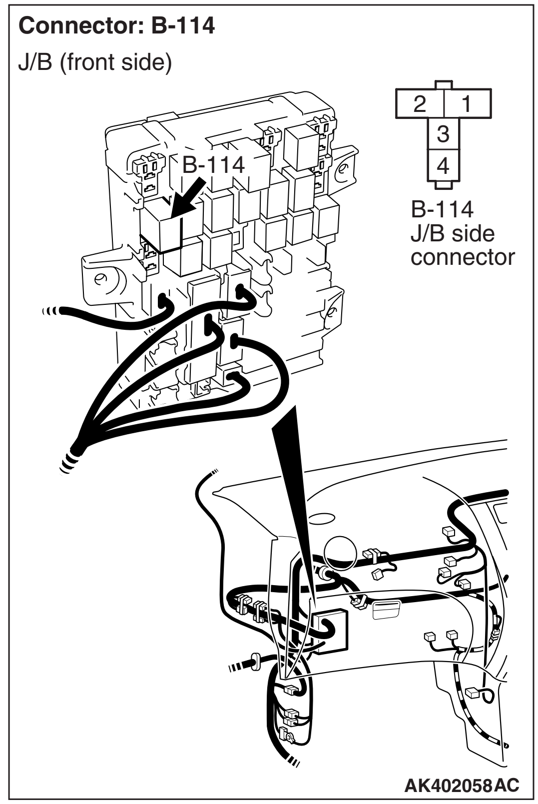


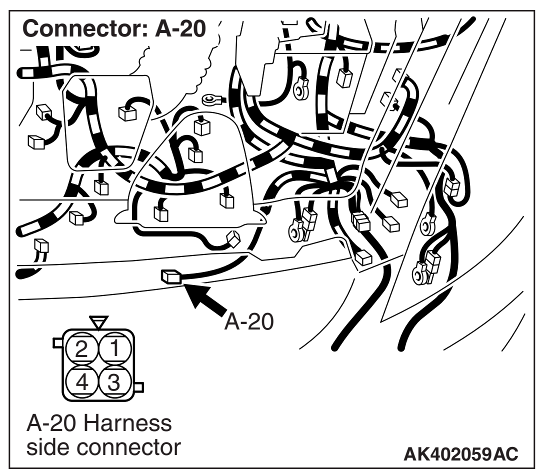
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace the connector.

STEP 9. Check harness between B-114 (terminal No. 4) cooling fan control relay connector and A-20 (terminal No. 1) cooling fan motor connector.





NOTE: Before checking harness, check intermediate connector B-109, and repair if necessary.

- Check power supply line for damage.

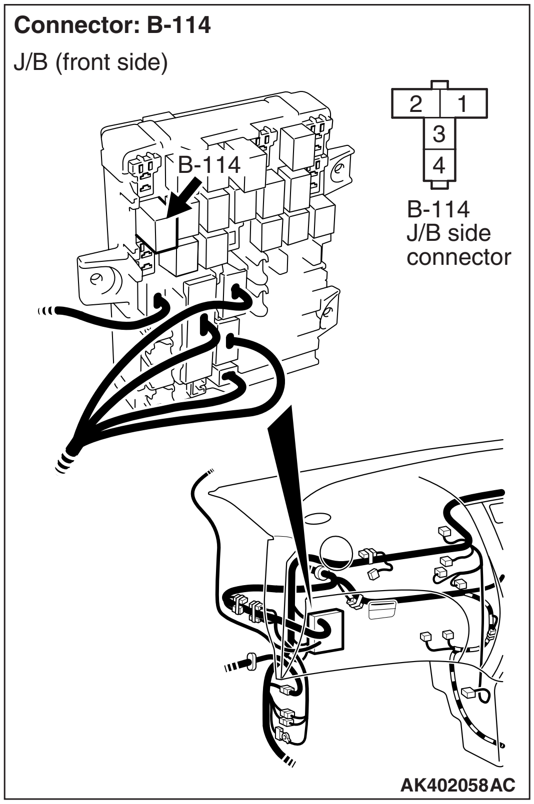
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

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STEP 10. Check harness between battery and B-114 (terminal No. 3) cooling fan control relay connector.



NOTE: Before checking harness, check intermediate connector B-108, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair the damaged harness wire.

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

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Inspection Procedure 22: Poor A/C performance

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by short /overcharged A/C refrigerant, failed A/C control system, failed fan control system or other faults.

PROBABLE CAUSES

- Short or overcharged A/C refrigerant
- Failed A/C compressor relay
- Failed cooling fan control relay
- Failed A/C-ECU
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Is the diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-20).
NO : Go to Step 2 .

STEP 2. A/C compressor magnet clutch operation check.

- Engine: Idling
- A/C set temperature:
  Maximum Cool when temperature in cabin is 25°C or more
  Maximum Hot when temperature in cabin is 25°C or less

OK:
Magnet clutch active (when A/C is ON)
Magnet clutch inactive (when A/C is OFF)

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Go to Step 3 .

STEP 3. M.U.T.-III data list

- Item 49: A/C relay
  a. Engine: Idling
  b. A/C set temperature:
  Maximum Cool when temperature in cabin is 25°C or more
  Maximum Hot when temperature in cabin is 25°C or less

OK:
ON (when A/C is ON)
OFF (when A/C is OFF)

Q: Is the check result normal?

YES : Check A/C system (Refer to GROUP 55A – Check Chart For Diagnosis Code P.55A-5).
NO : Check A/C compressor relay (Refer to Inspection Procedure 26 P.13A-310).

STEP 4. M.U.T.-III actuator test

- Refer to Actuator Test Reference Table P.13A-341.
  a. Item 20: Cooling fan motor

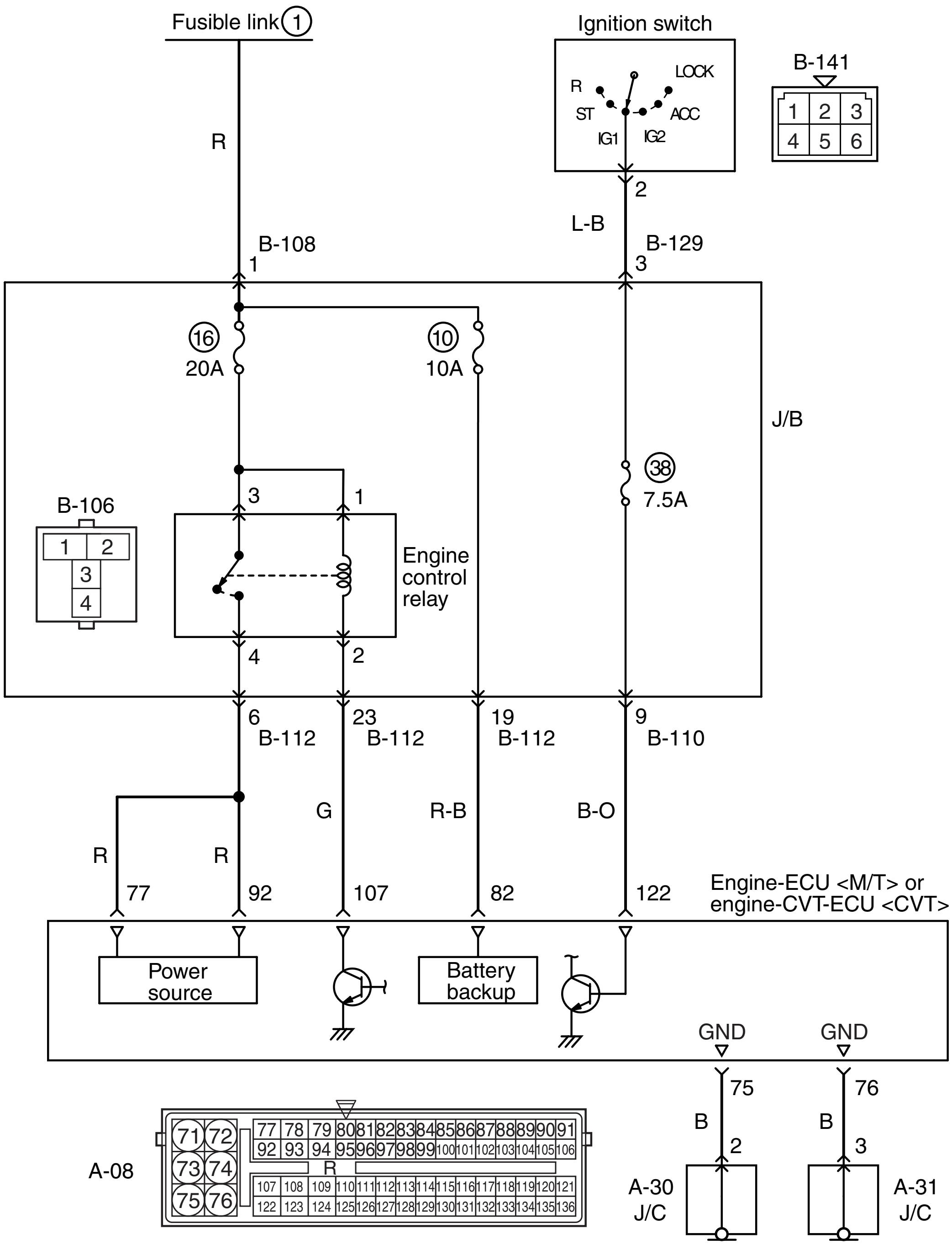
Q: Are the check results normal?

YES : Check charged amount of A/C refrigerant (Refer to GROUP 55 – On-vehicle Service – Check The Refrigerant Level P.55A-50).
NO : Check fan control relay system (Refer to Inspection Procedure 25 P.13A-302).

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Inspection Procedure 23: Engine-ECU <M/T> or engine-CVT-ECU <CVT> power supply, engine control relay, ignition switch-IG1 system

Power Supply And Ignition Switch-IG Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

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OPERATION

- The battery voltage is applied to the engine control relay (terminal No. 1 and 3).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 107) makes the power transistor in the unit be in ON position and makes currents go on the engine control relay coil, and that makes the relay be in ON position.
- When the engine control relay is in ON position, the battery voltage is supplied to the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the sensor and the actuator from the engine control relay (terminal No. 4).

FUNCTION

- When the ignition switch ON signal is input to the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the engine-ECU <M/T> or engine-CVT-ECU <CVT> places the engine control relay in the ON position. Accordingly, the battery voltage is supplied to the engine-ECU <M/T> or engine-CVT-ECU <CVT>, sensor and actuator.

PROBABLE CAUSES

- Failed battery
- Failed engine control relay
- Open/short/damaged circuit in engine control relay circuit or loose connector contact
- Open/short/damaged circuit in ignition switch-IG1 circuit or loose connector contact
- Open/damaged circuit in engine-ECU <M/T> or engine-CVT-ECU <CVT> earth circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage during cranking.

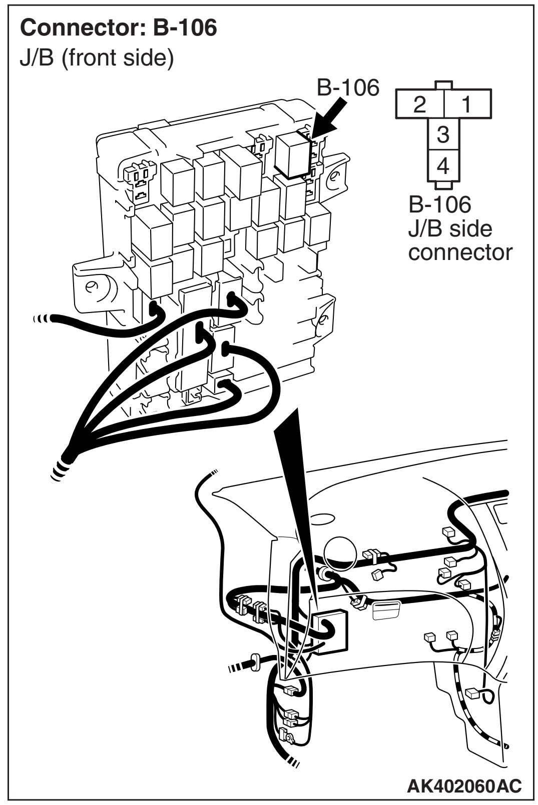
OK: 8 V or more

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test P.54A-5).

STEP 2. Connector check: B-106 engine control relay connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check engine control relay.

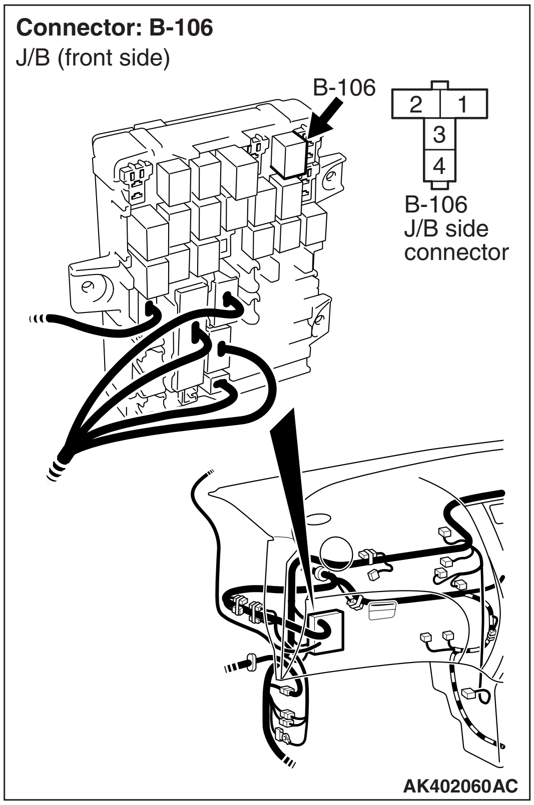
- Check engine control relay (Refer to P.13A-360).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace engine control relay.

STEP 4. Perform voltage measurement at B-106 engine control relay connector.



- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth, also between terminal No. 3 and earth.

OK: System voltage

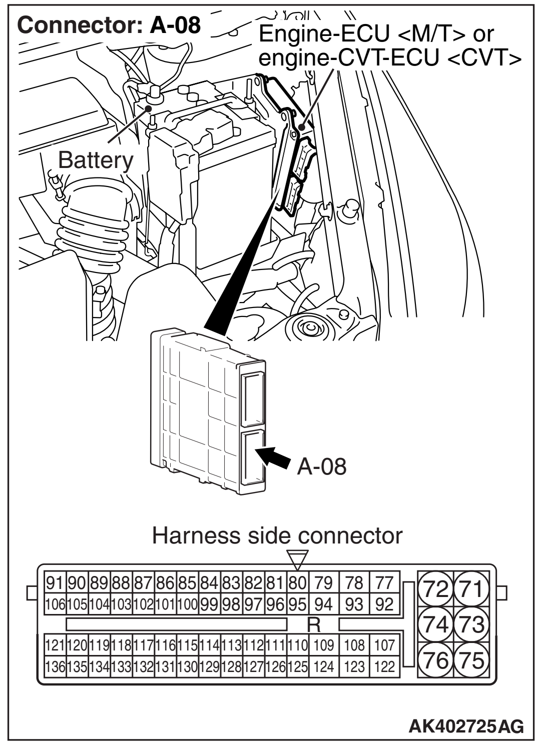
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check intermediate connector B-108, and repair if necessary. If intermediate connector is normal, check and repair harness between B-106 (terminal No. 1 and terminal No. 3) engine control relay connector and battery.

- Check power supply line for open/short circuit.

STEP 5. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



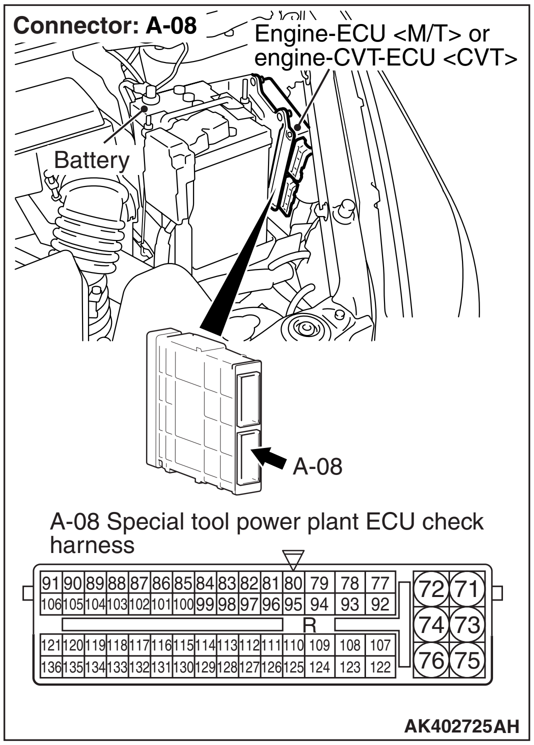
Q: Is the check result normal?

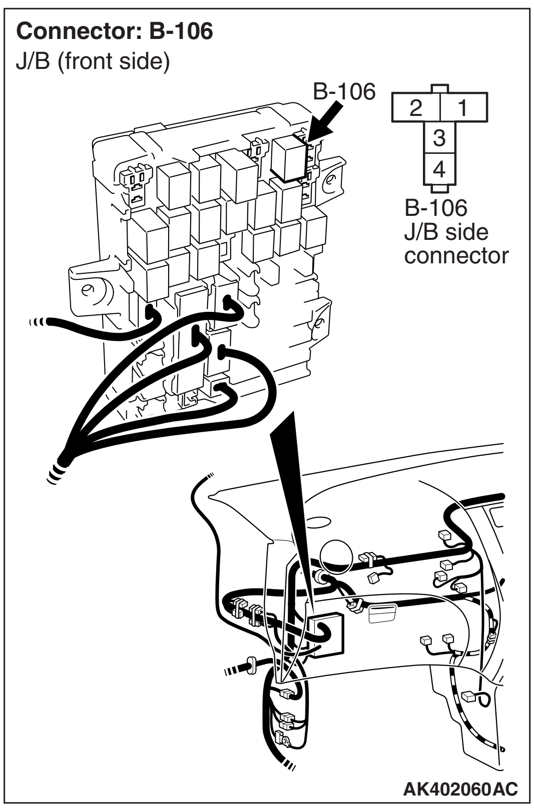
YES : Go to Step 6 .

NO : Repair or replace the connector.

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STEP 6. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.





- Disconnect engine-ECU connector or engine-CVT-ECU connector, and connect Special Tool Power Plant ECU Check Harness (MB991987), and then measure the voltage on the check connector.
- Ignition switch: ON
- Voltage between terminal No. 77 and earth, also between terminal No. 92 and earth.

OK: System voltage

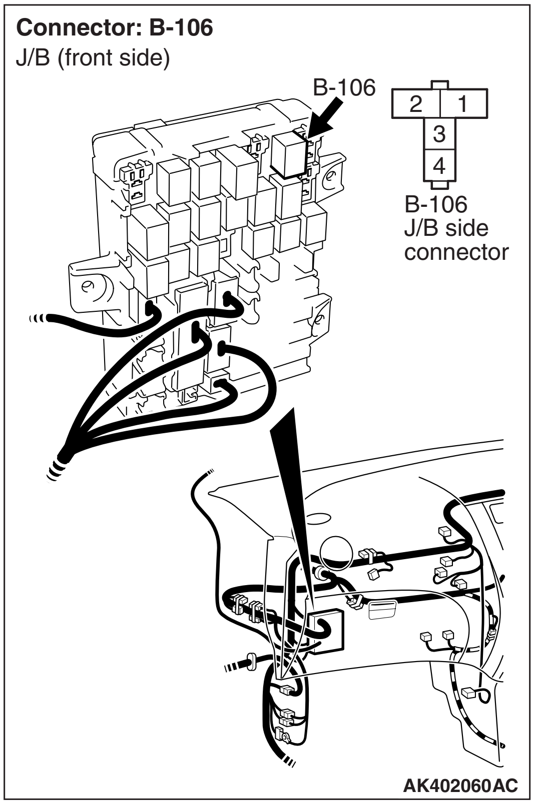
Q: Is the check result normal?

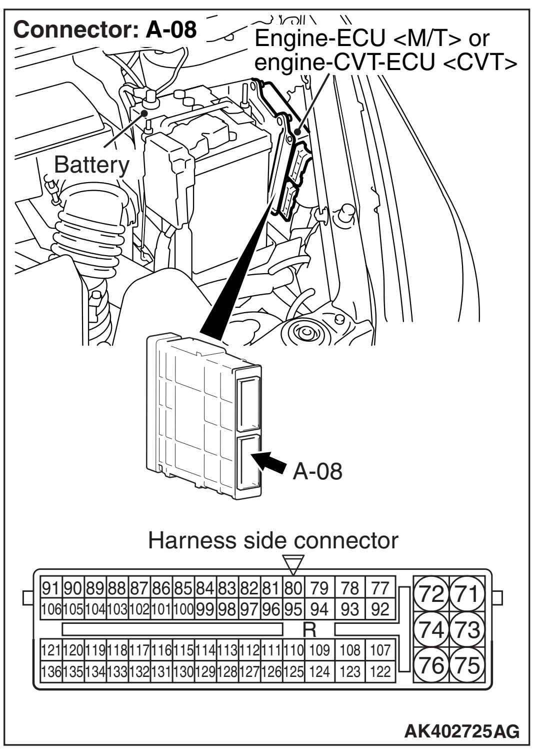
YES : Check intermediate connector B-112, and repair if necessary. If intermediate connector is normal, check and repair harness between B-106 (terminal No. 2) engine control relay connector and A-08 (terminal No. 107) engine-ECU connector or engine-CVT-ECU connector.
- Check signal line for short circuit.

NO : Go to Step 7 .

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STEP 7. Check harness between B-106 (terminal No. 4) engine control relay connector and A-08 (terminal No. 77 and No. 92) engine-ECU connector or engine-CVT-ECU connector.





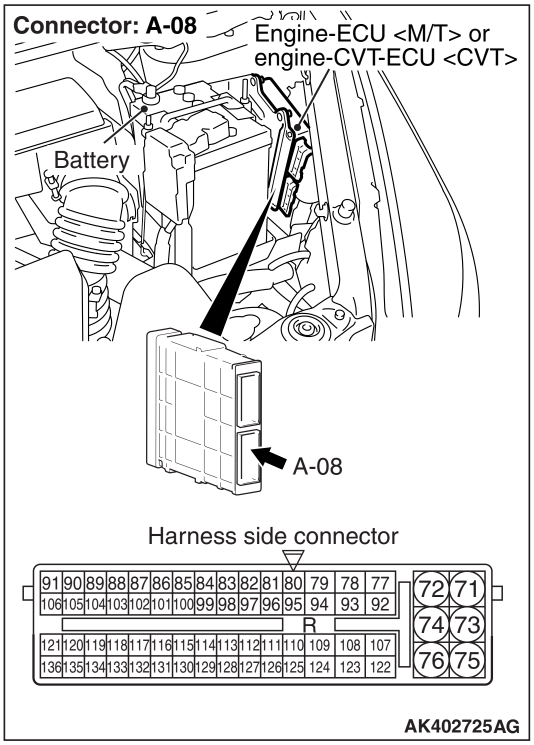
- Check power supply line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



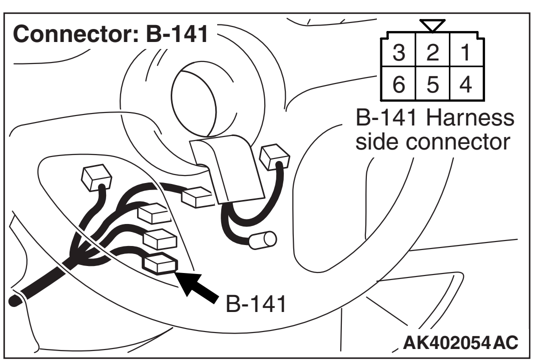
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 122 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .
NO : Go to Step 9 .

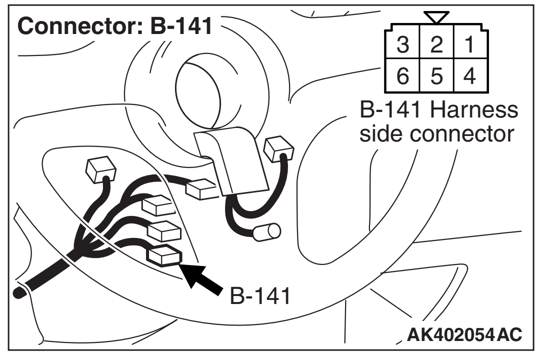
STEP 9. Connector check: B-141 ignition switch connector

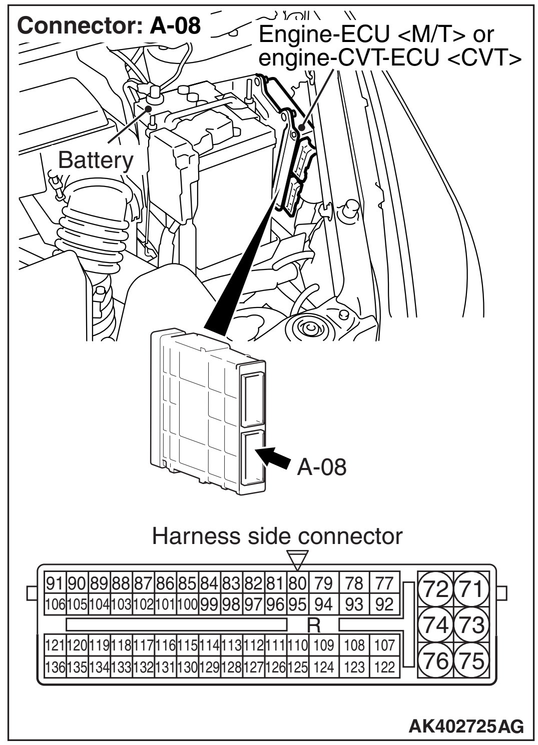


Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair or replace the connector.

STEP 10. Check ignition switch.





- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Inspection P.54A-27).

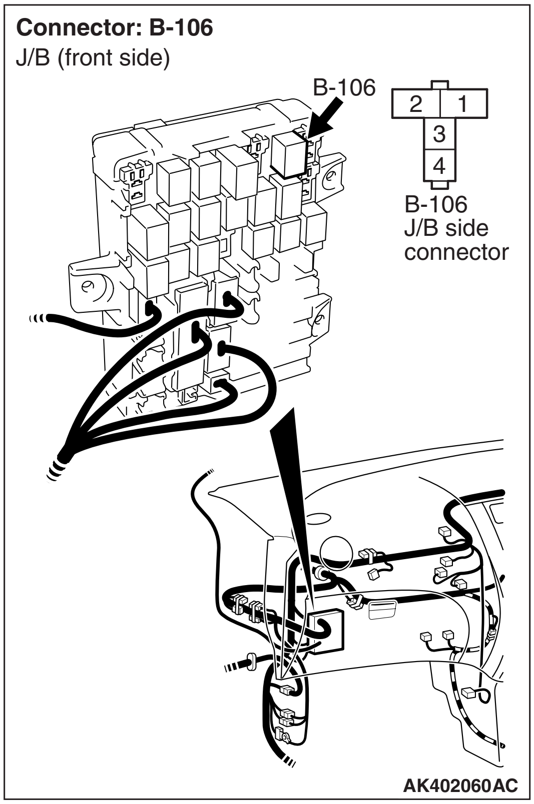
Q: Is the check result normal?

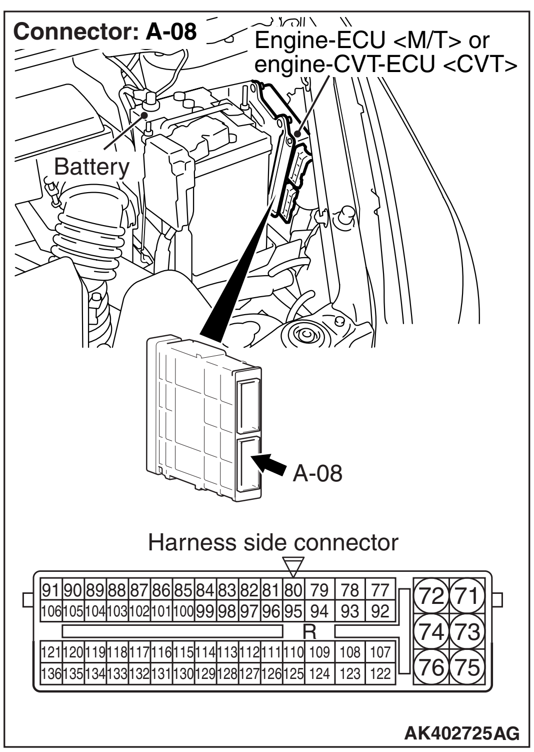
YES : Check intermediate connector B-110, B-129, and repair if necessary. If intermediate connector is normal, check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-08 (terminal No. 122) engine-ECU connector or engine-CVT-ECU connector.
- Check output line for open/short circuit and damage.

NO : Replace ignition switch.

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STEP 11. Check harness between B-106 (terminal No. 2) engine control relay connector and A-08 (terminal No. 107) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connector B-112, and repair if necessary.

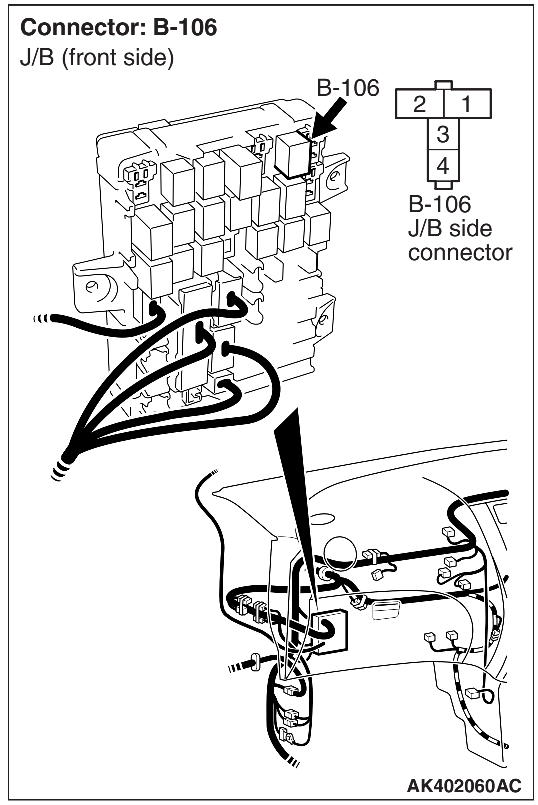
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair the damaged harness wire.

STEP 12. Check harness between B-106 (terminal No. 1 and No. 3) engine control relay connector and battery.



NOTE: Before checking harness, check intermediate connector B-108, and repair if necessary.

- Check power supply line for damage.

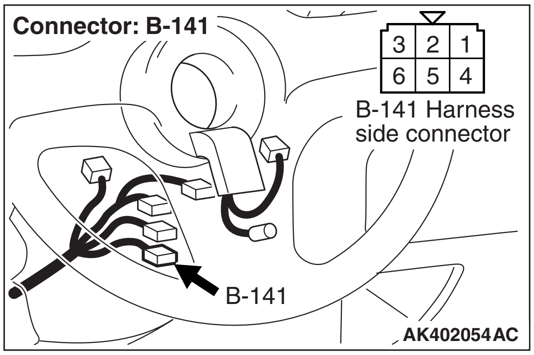
Q: Is the check result normal?

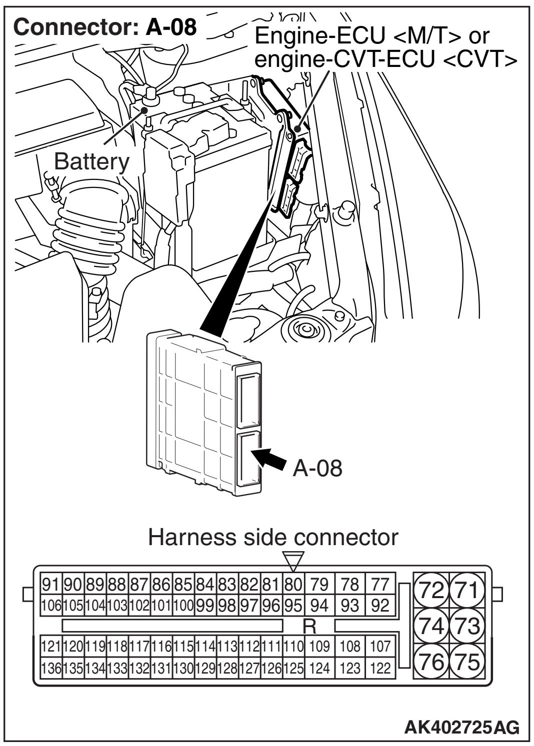
YES : Go to Step 13 .

NO : Repair the damaged harness wire.

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STEP 13. Check harness between B-141 (terminal No. 2) ignition switch connector and A-08 (terminal No. 122) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connectors B-110, B-129, and repair if necessary.

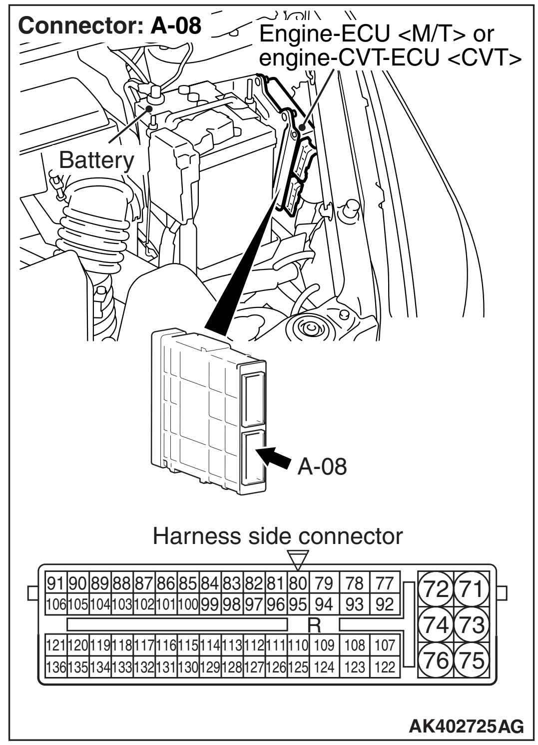
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair the damaged harness wire.

STEP 14. Check harness between A-08 (terminal No. 75 and No. 76) engine-ECU connector or engine-CVT-ECU connector and body earth.



NOTE: Before checking harness, check intermediate connectors A-30, A-31, and repair if necessary.

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

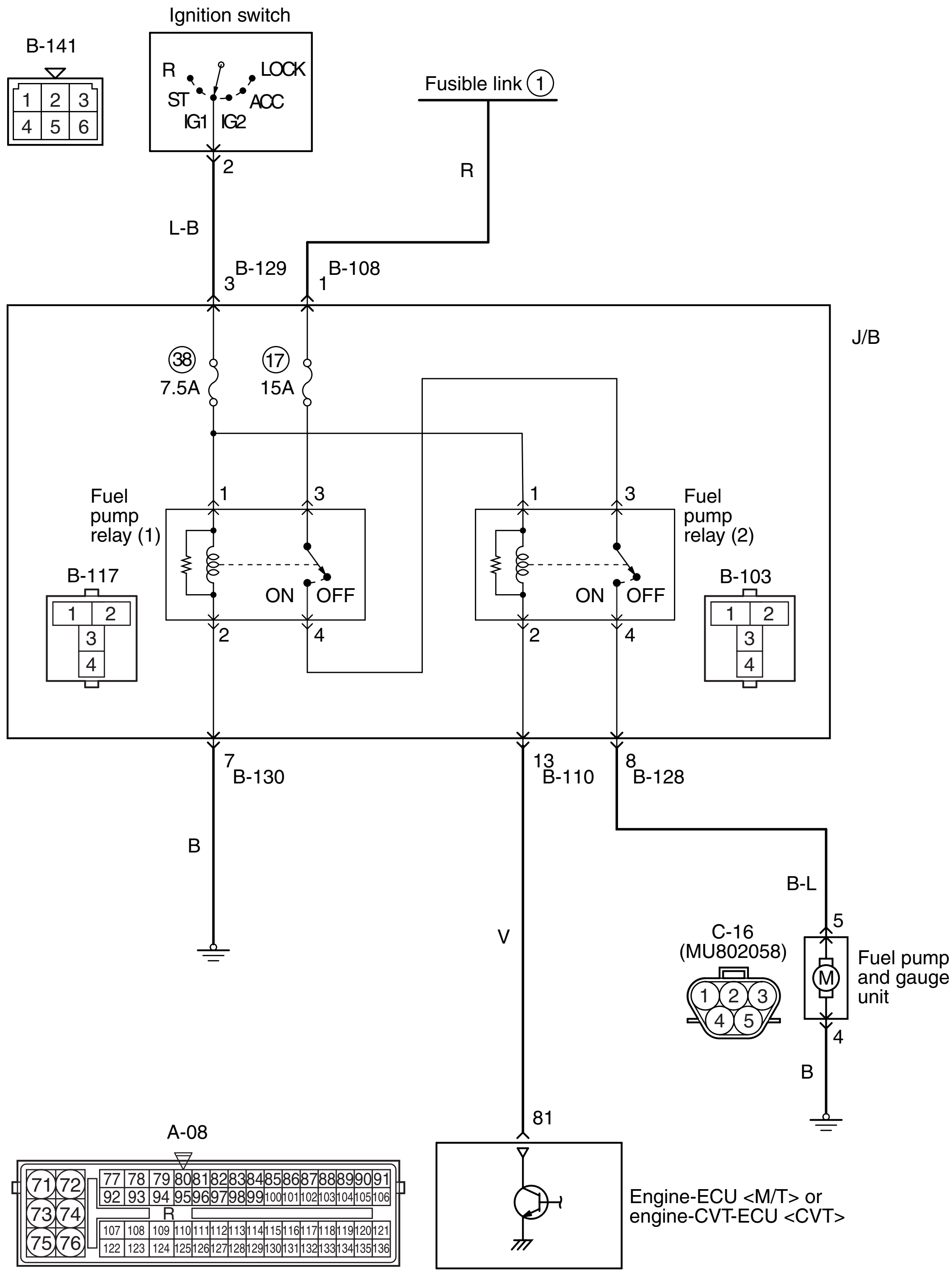
YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

NO : Repair the damaged harness wire.

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Inspection Procedure 24: Fuel pump system

Fuel Pump Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet Pu: Purple

AK402703AD

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OPERATION

- The battery voltage is applied to the fuel pump relay (1) (terminal No. 1) form the ignition switch and is earthed to the vehicle body from the fuel pump relay (1) (terminal No. 2).
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 3) and to the fuel pump relay (2) (terminal No. 3) from the fuel pump relay (1) (terminal No. 4).
- The battery voltage is applied to the fuel pump relay (2) (terminal No. 1) from the ignition switch. The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 110) makes the power transistor in the unit be in ON position and makes currents go on the fuel pump relay (2) coil, and that makes the relay be in ON position.
- When the fuel pump relay (2) is in ON position, the battery voltage is supplied to the fuel pump (low pressure) from the fuel pump relay (2) (terminal No. 4).

FUNCTION

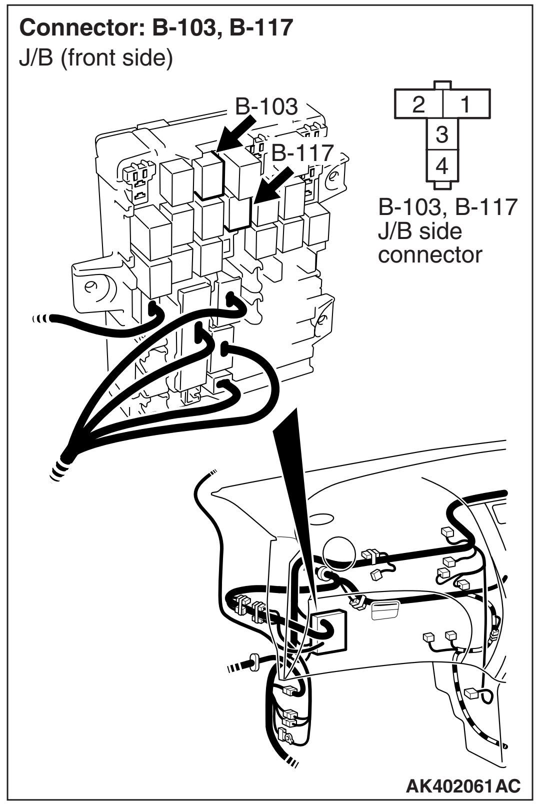
- When the ignition switch ON signal is input to the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the engine-ECU <M/T> or engine-CVT-ECU <CVT> places the fuel pump relay (2) in the ON position. Accordingly, the battery voltage is supplied to the fuel pump.

PROBABLE CAUSES

- Failed fuel pump relay
- Failed fuel pump
- Open/short/damaged circuit in fuel pump drive circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-117 fuel pump relay (1) connector and B-103 fuel pump relay (2) connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

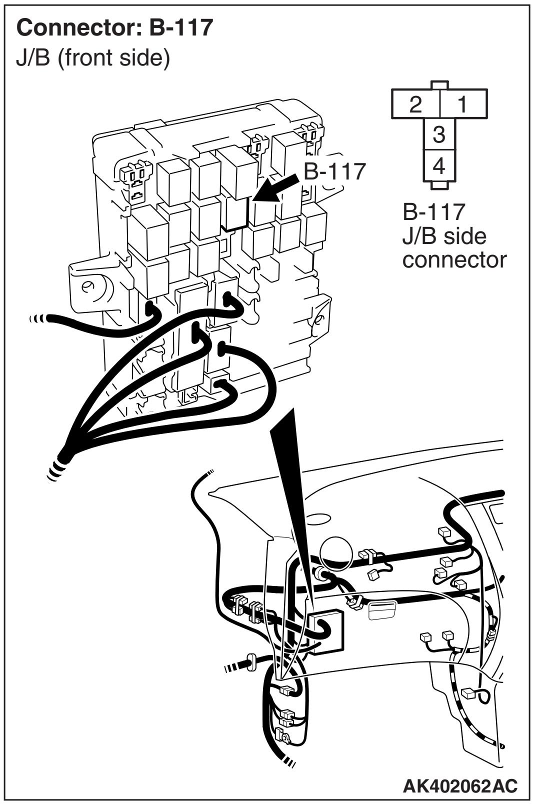
STEP 2. Check fuel pump relay.

- Fuel pump relay, continuity check (Refer to P.13A-360).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace fuel pump relay.

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STEP 3. Perform resistance measurement at B-117 fuel pump relay (1) connector.



- Remove relay, and measure at junction block side.
- Resistance between terminal No. 2 and earth.

OK: Continuity (2 Ω or less)

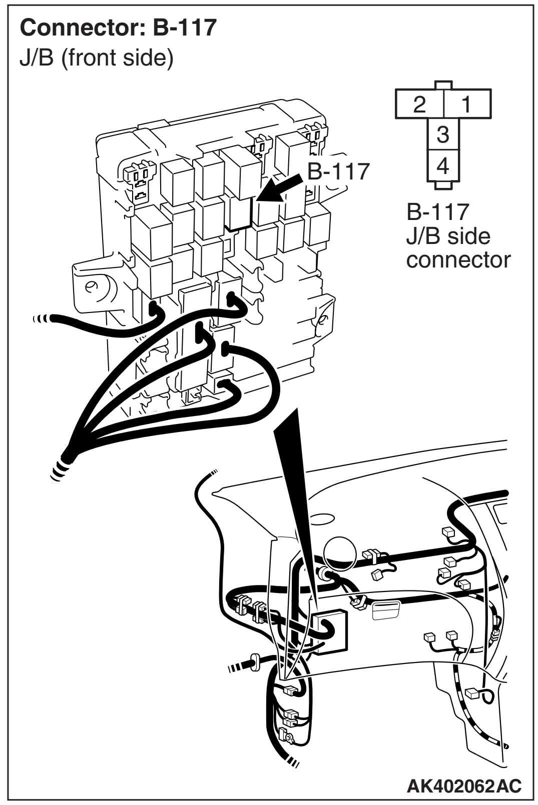
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connector B-130, and repair if necessary. If intermediate connector is normal, check and repair harness between B-117 (terminal No. 2) fuel pump relay (1) connector and body earth.

- Check earthing line for open circuit and damage.

STEP 4. Perform voltage measurement at B-117 fuel pump relay (1) connector.



- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

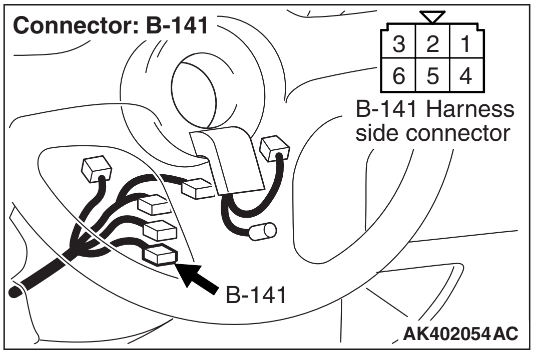
Q: Is the check result normal?

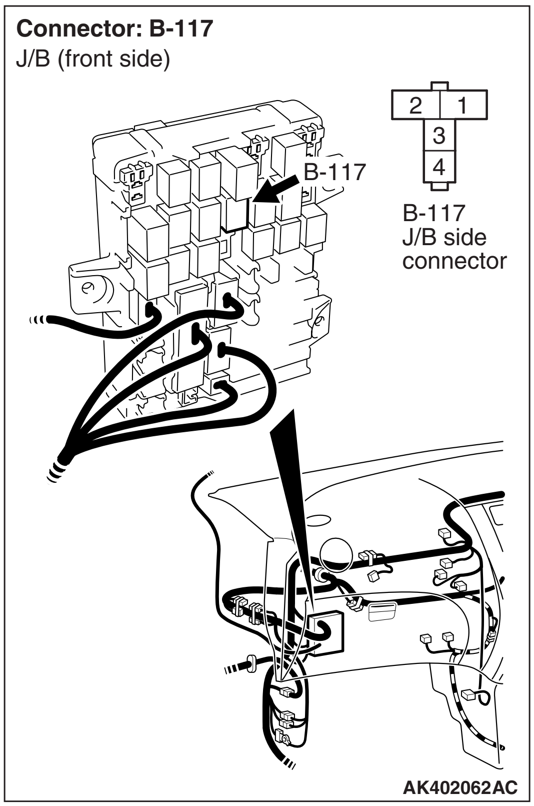
YES : Go to Step 6 .

NO : Go to Step 5 .

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STEP 5. Connector check: B-141 ignition switch connector





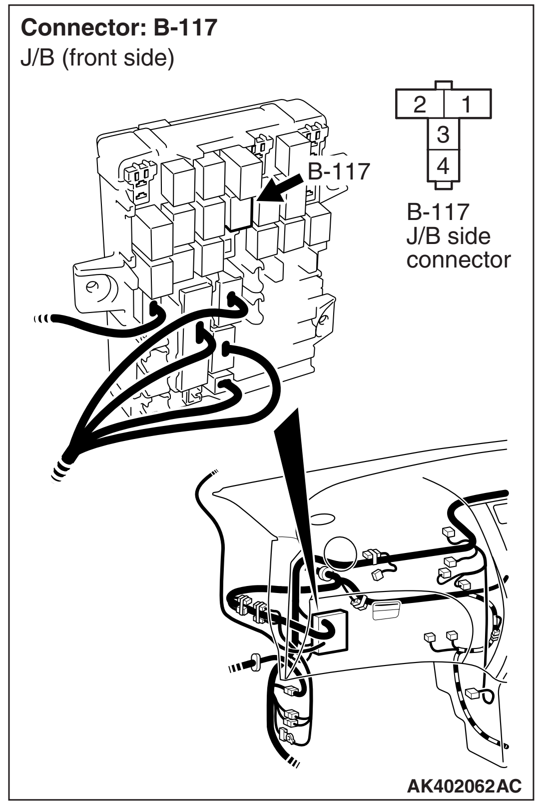
Q: Is the check result normal?

YES : Check intermediate connector B-129, and repair if necessary. If intermediate connector is normal, check and repair harness between B-117 (terminal No. 1) fuel pump relay (1) connector and B-141 (terminal No. 2) ignition switch connector.

- Check power supply line for open circuit and damage.

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at B-117 fuel pump relay (1) connector.



- Remove relay, and measure at junction block side.
- Voltage between terminal No. 3 and earth.

OK: System voltage

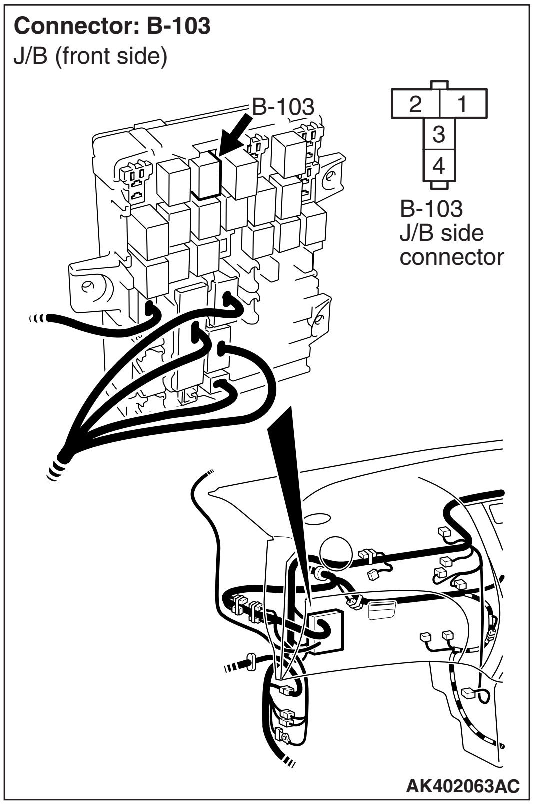
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Check intermediate connectors B-108, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-117 (terminal No. 3) fuel pump relay (1) connector and battery.

- Check power supply line for open/short circuit.

STEP 7. Perform resistance measurement at B-103 fuel pump relay (2) connector.



- Remove relay, and measure at junction block side.
- Ignition switch: ST
- Resistance between terminal No. 2 and earth.

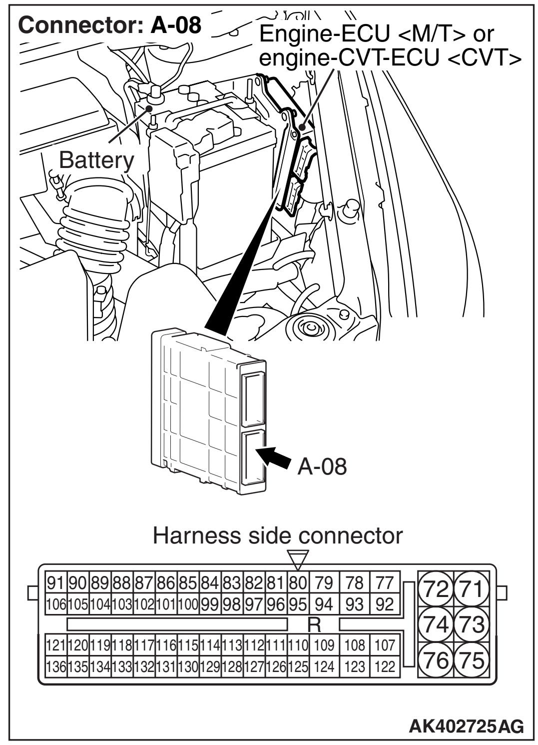
OK: Continuity

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 8 .

STEP 8. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

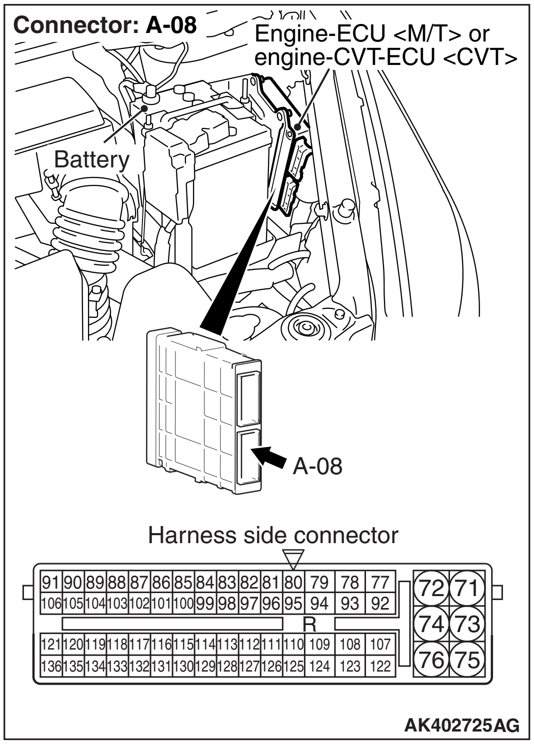


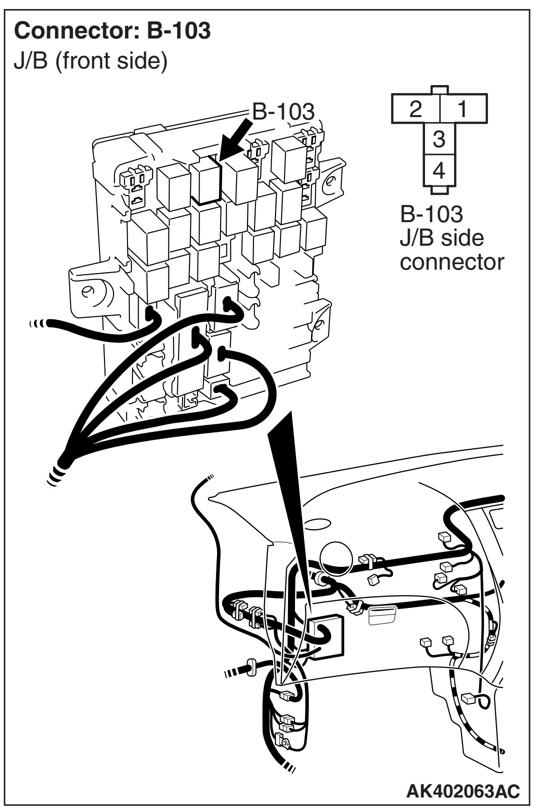
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace the connector.

STEP 9. Check harness between A-08 (terminal No.110) engine-ECU connector or engine-CVT-ECU connector and B-103 (terminal No. 2) fuel pump relay (2) connector.





NOTE: Before checking harness, check intermediate connector B-110, and repair if necessary.

- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 15

NO : Repair the damaged harness wire.

STEP 10. M.U.T.-III actuator test

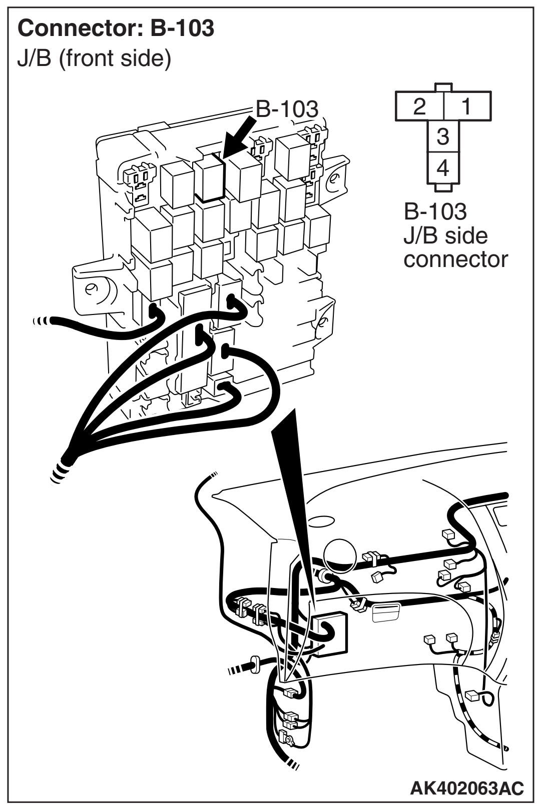
- Refer to Actuator Test Reference Table P.13A-341.
  a. Item 07: Fuel pump relay

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 11. Perform voltage measurement at B-103 fuel pump relay (2) connector.



- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

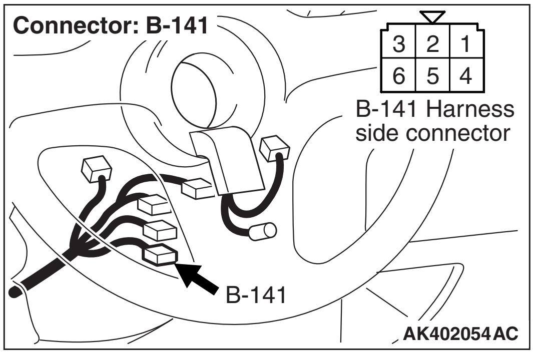
Q: Is the check result normal?

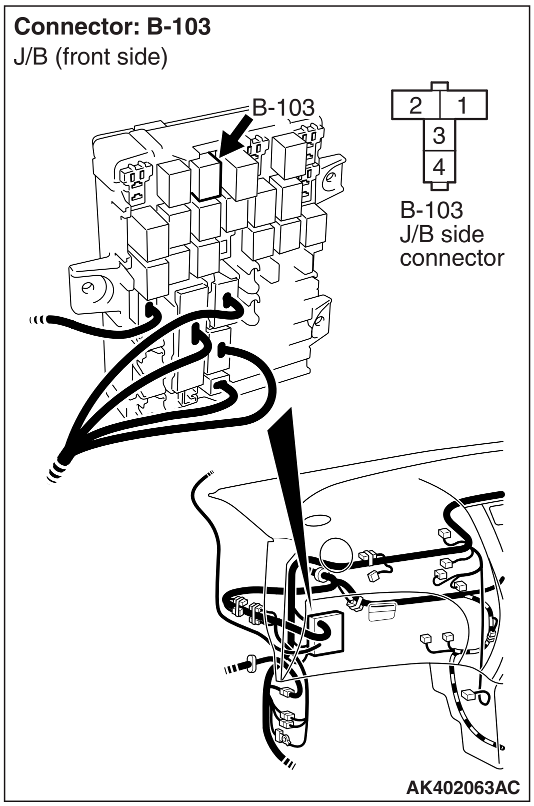
YES : Go to Step 13 .

NO : Go to Step 12 .

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STEP 12. Connector check: B-141 ignition switch connector





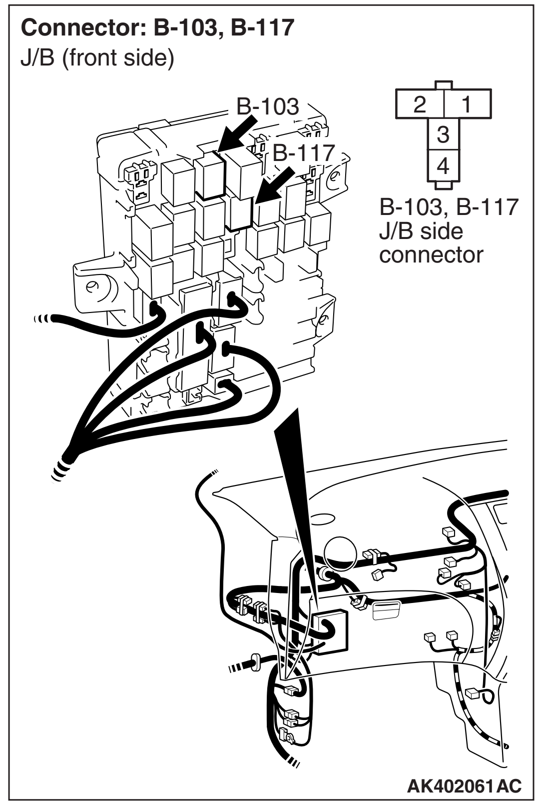
Q: Is the check result normal?

YES : Check intermediate connector B-129, and repair if necessary. If intermediate connector is normal, check and repair harness between B-103 (terminal No. 1) fuel pump relay (2) connector and B-141 (terminal No. 2) ignition switch connector.

- Check power supply line for open circuit.

NO : Repair or replace the connector.

STEP 13. Perform voltage measurement at B-103 fuel pump relay (2) connector.



- Disconnect relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

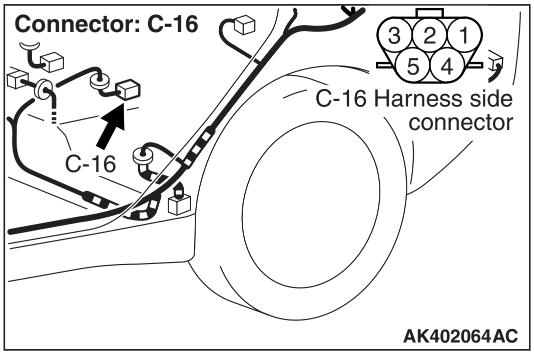
YES : Go to Step 14 .

NO : Check and repair harness between B-117 (terminal No. 4) fuel pump relay (1) connector and B-103 (terminal No. 3) fuel pump relay (2) connector.

- Check power supply line for open/short circuit.

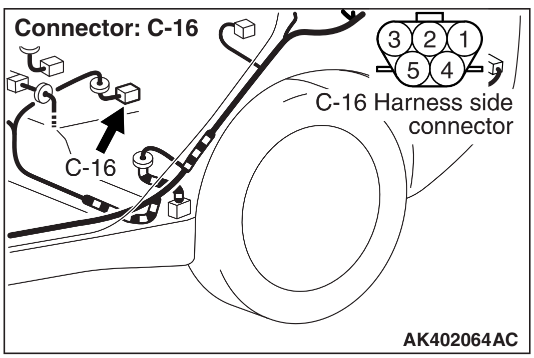
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STEP 14. Connector check: C-16 fuel pump connector



Q: Is the check result normal?
YES : Go to Step 15 .
NO : Repair or replace the connector.

STEP 15. Perform resistance measurement at C-16 fuel pump connector.

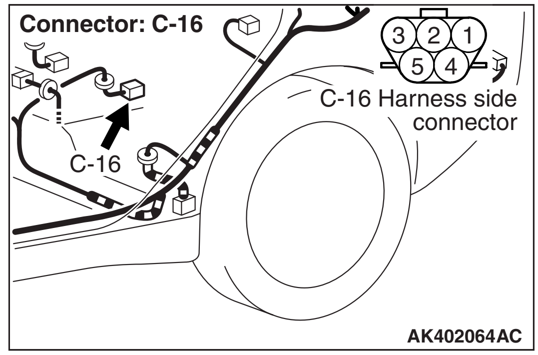


- Remove connector, and measure at harness side.
- Resistance between terminal No. 4 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?
YES : Go to Step 18 .
NO : Go to Step 16 .

STEP 16. Check harness between C-16 (terminal No. 4) fuel pump connector and body earth.



- Check earthing line for damage.

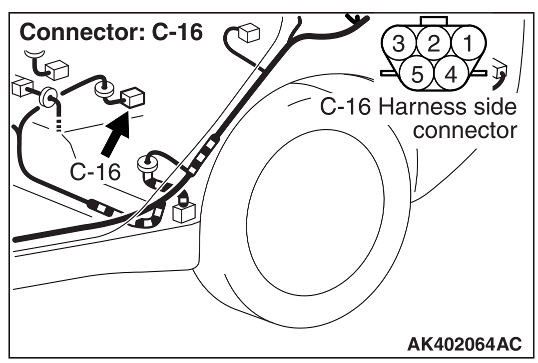
Q: Is the check result normal?
YES : Go to Step 17
NO : Repair the damaged harness wire.

STEP 17. M.U.T.-III actuator test

- Refer to Actuator Test Reference Table P.13A-341.
  a. Item 07: Fuel pump relay

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

STEP 18. Perform voltage measurement at C-16 fuel pump connector.



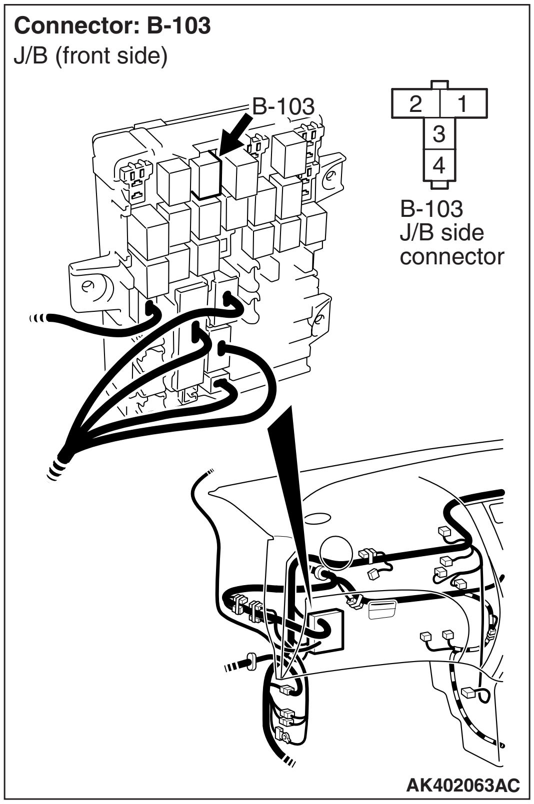
- Disconnect connector, and measure at harness side.
- Ignition switch: ST
- Voltage between terminal No. 5 and earth.

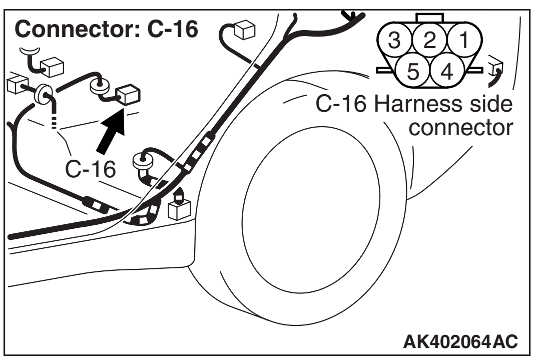
OK: System voltage

Q: Is the check result normal?
YES : Go to Step 23 .
NO : Go to Step 19 .

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STEP 19. Check harness between B-103 (terminal No. 4) fuel pump relay (2) connector and C-16 (terminal No. 5) fuel pump connector.





NOTE: Before checking harness, check intermediate connector B-128, and repair if necessary.

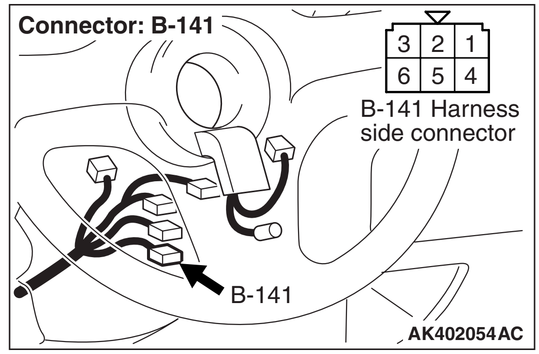
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair the damaged harness wire.

STEP 20. Connector check: B-141 ignition switch connector



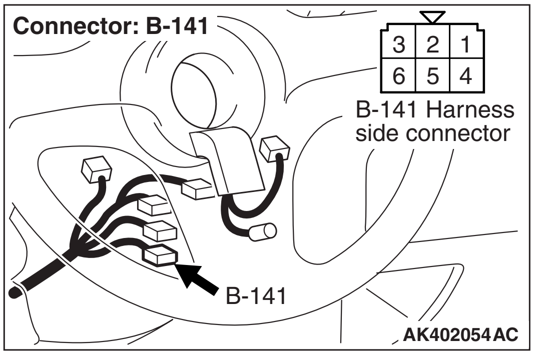
Q: Is the check result normal?

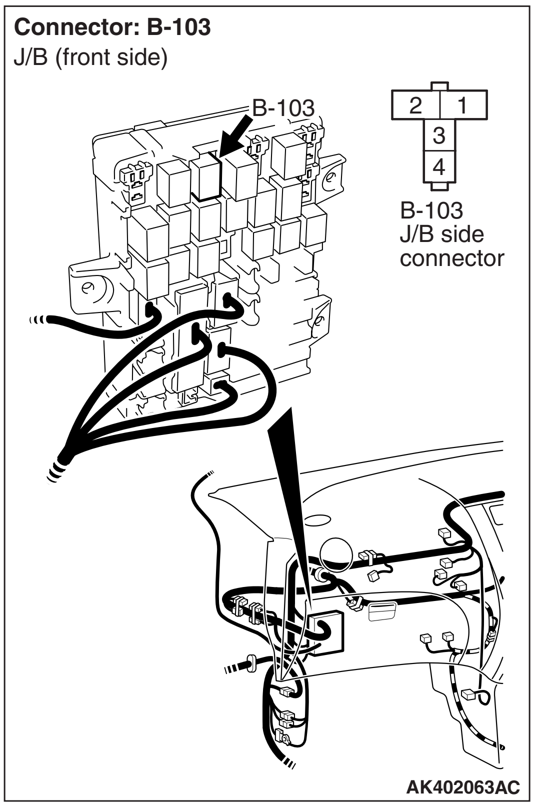
YES : Go to Step 21 .

NO : Repair or replace the connector.

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STEP 21. Check harness between B-141 (terminal No. 2) ignition switch connector and B-103 (terminal No. 1) fuel pump relay (2) connector.





NOTE: Before checking harness, check intermediate connector B-129, and repair if necessary.

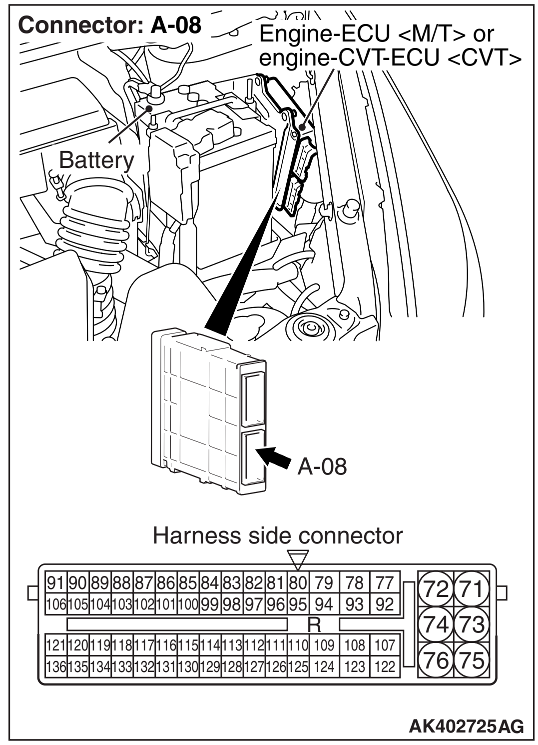
- Check power supply line for damage.

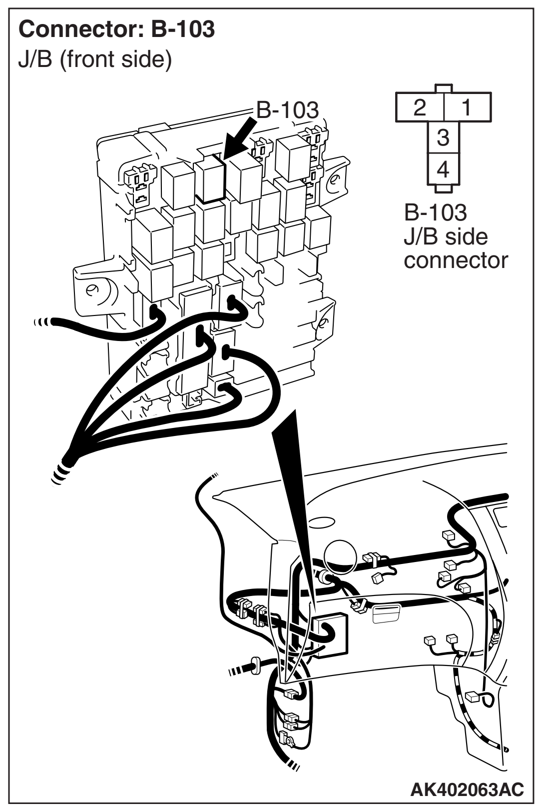
Q: Is the check result normal?

YES : Go to Step 22 .

NO : Repair the damaged harness wire.

STEP 22. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector





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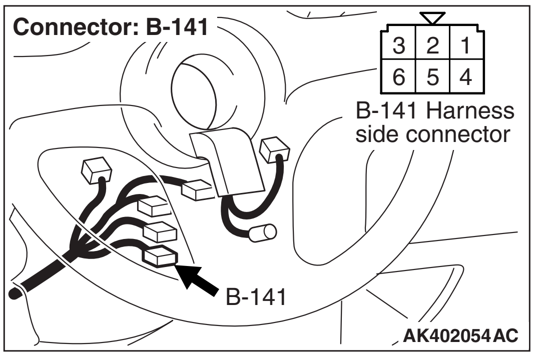
Q: Is the check result normal?

YES : Check intermediate connector B-110, and repair if necessary. If intermediate connector is normal, check and repair harness between A-08 (terminal No. 110) engine-ECU connector or engine-CVT-ECU connector and B-103 (terminal No. 2) fuel pump relay (2) connector.

- Check earthing line for damage.

NO : Repair or replace the connector.

STEP 23. Connector check: B-141 ignition switch connector

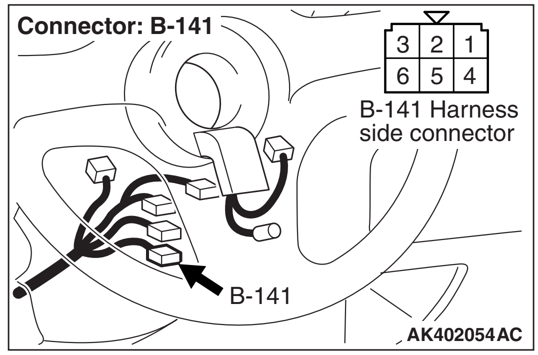


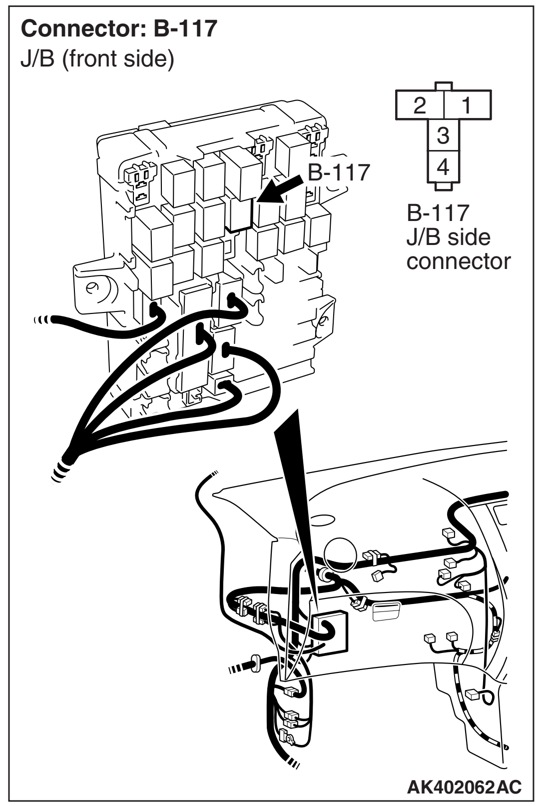
Q: Is the check result normal?

YES : Go to Step 22 .

NO : Repair or replace the connector.

STEP 24. Check harness between B-141 (terminal No. 2) ignition switch connector and B-117 (terminal No. 1) fuel pump relay (1) connector.





NOTE: Before checking harness, check intermediate connector B-129, and repair if necessary.

- Check power supply line for damage.

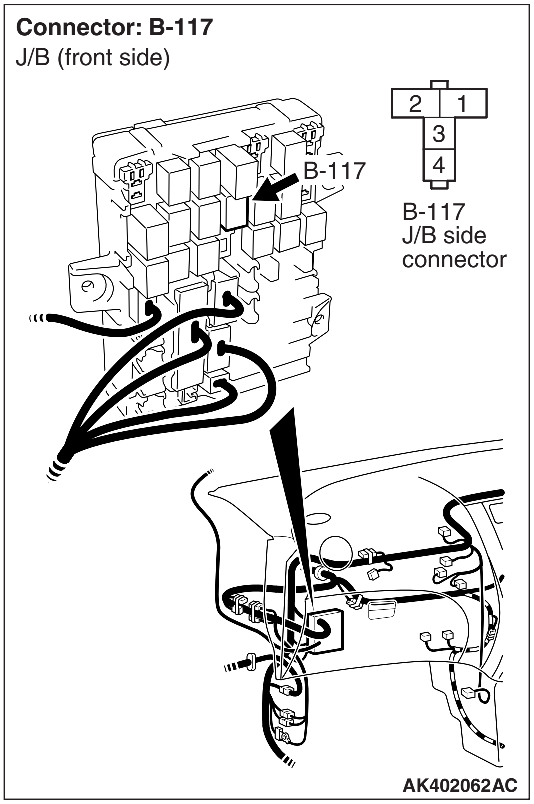
Q: Is the check result normal?

YES : Go to Step 25 .

NO : Repair the damaged harness wire.

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STEP 25. Check harness between battery and B-117 (terminal No. 3) fuel pump relay (1) connector.



NOTE: Before checking harness, check intermediate connector B-108, and repair if necessary.

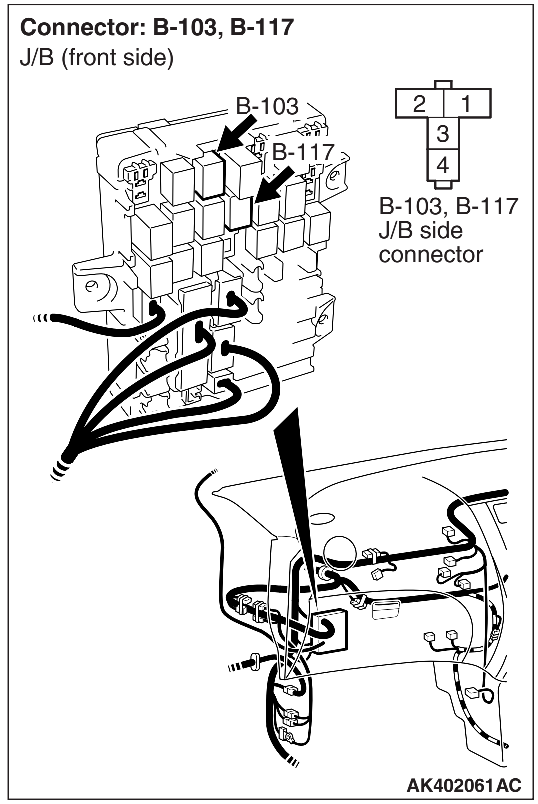
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 26 .

NO : Repair the damaged harness wire.

STEP 26. Check harness between B-117 (terminal No. 4) fuel pump relay (1) connector and B-103 (terminal No. 3) fuel pump relay (2) connector.



- Check power supply line for damage.

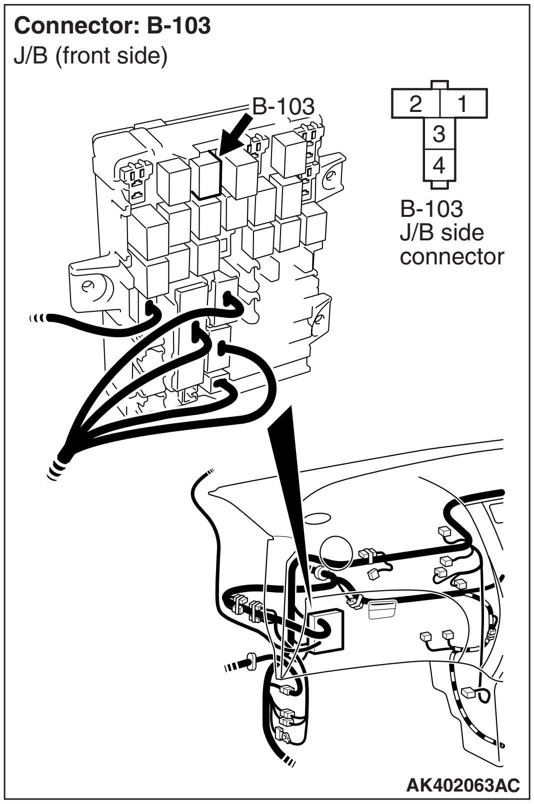
Q: Is the check result normal?

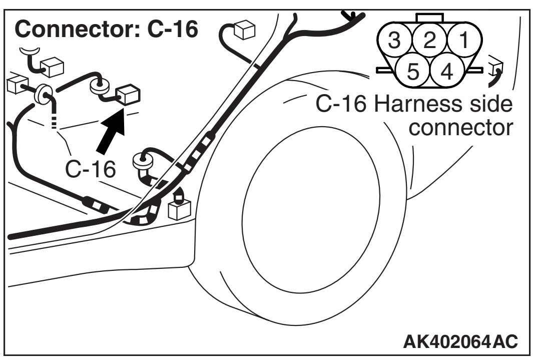
YES : Go to Step 27 .

NO : Repair the damaged harness wire.

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STEP 27. Check harness between B-103 (terminal No. 4) fuel pump relay (2) connector and C-16 (terminal No. 5) fuel pump connector.





NOTE: Before checking harness, check intermediate connectors B-128, and repair if necessary.

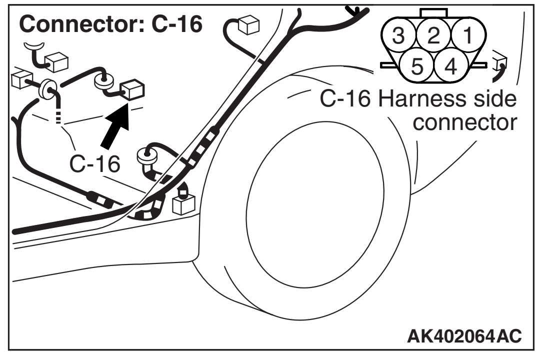
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 28 .

NO : Repair the damaged harness wire.

STEP 28. Check harness between C-16 (terminal No. 4) fuel pump connector and body earth.



- Check earthing line for damage.

Q: Is the check result normal?

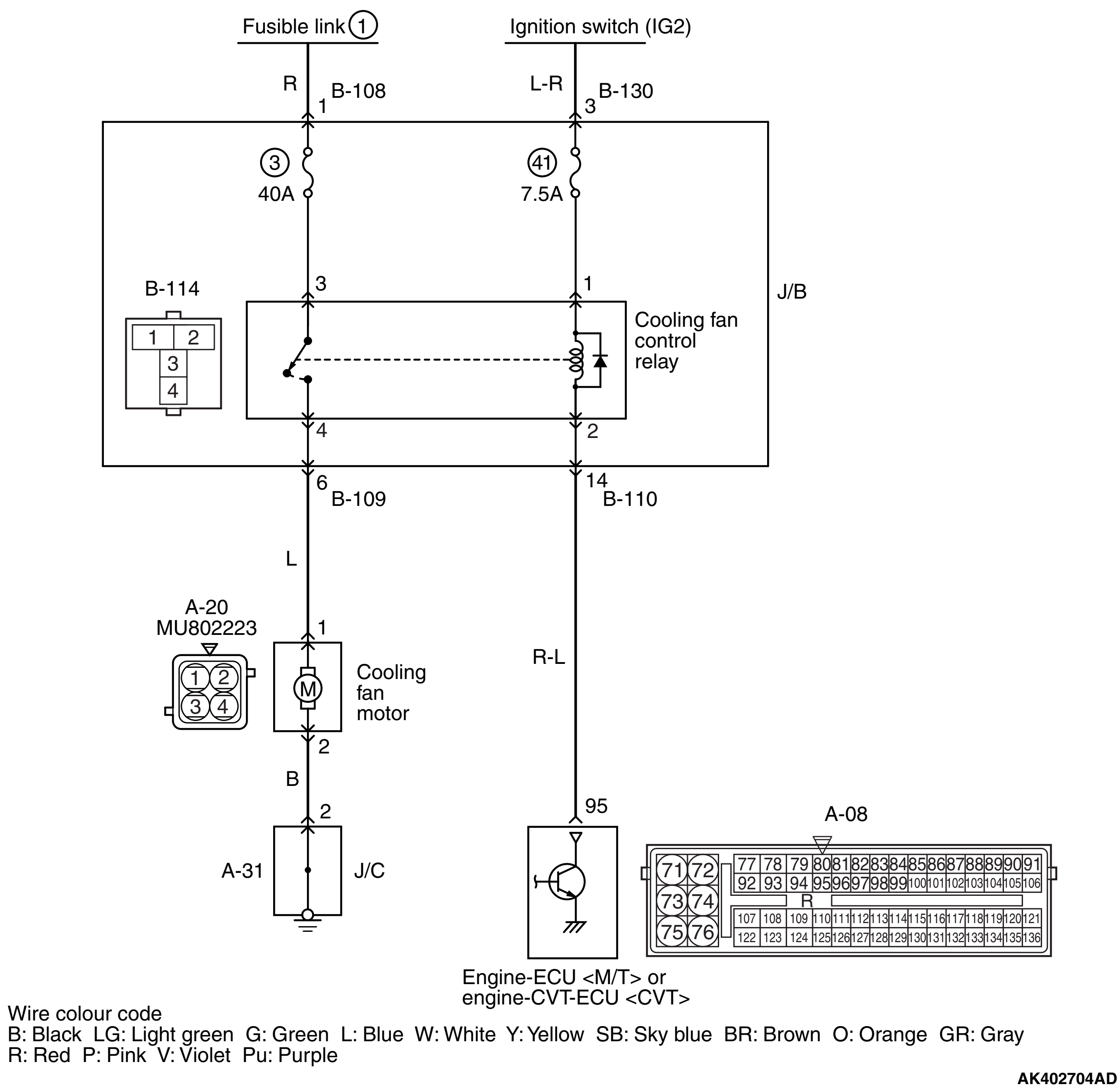
YES : Replace fuel pump.

NO : Repair the damaged harness wire.

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Inspection Procedure 25: Fan control relay system

Cooling Fan Control Relay Circuit



OPERATION

- The battery voltage is applied to the cooling fan control relay coil (terminal No. 1) from the ignition switch.
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 95) turns on the switch of the power transistor on the unit, and then turns on the switch of the relay by applying the electrical current to the cooling fan control relay coil.
- When the cooling fan control relay is in ON position, the battery voltage is applied to the cooling fan motor (terminal No. 1) from the cooling fan control relay (terminal No. 4).

FUNCTION

- When the cooling fan control relay is in ON position, the fan motor rotates.

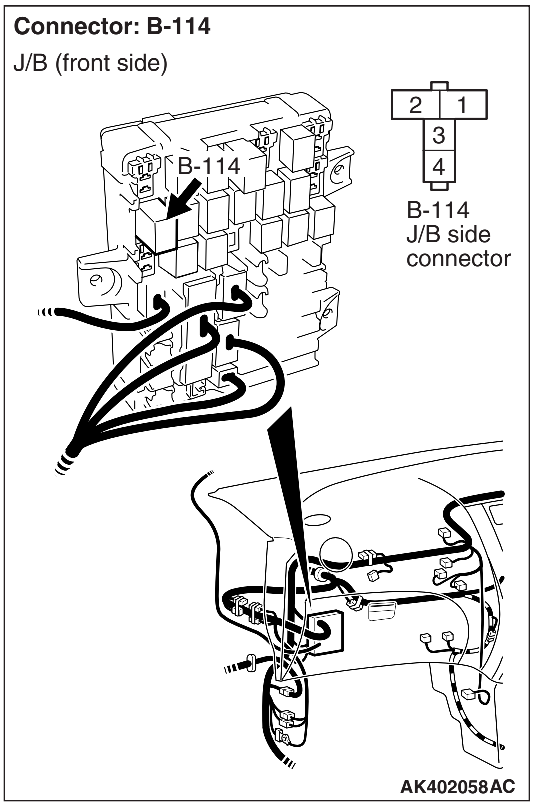
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PROBABLE CAUSES

- Failed cooling fan control relay
- Failed cooling fan motor
- Open/short/damaged circuit in cooling fan control relay circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-114 cooling fan control relay connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Check cooling fan control relay.

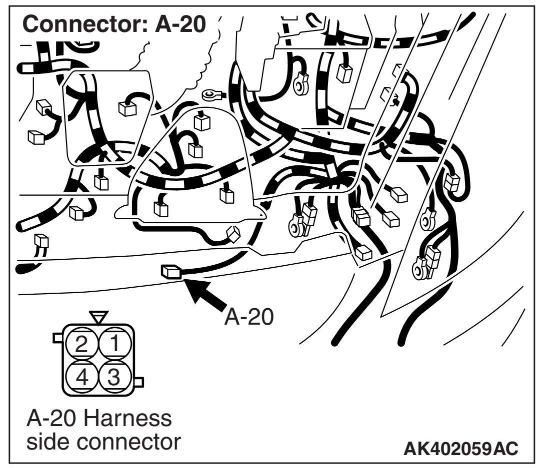
- Check cooling fan control relay (Refer to GROUP 14 − On-vehicle Service − Fan Control Relay Continuity Check P.14-8).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace fan control relay.

STEP 3. Connector check: A-20 cooling fan motor connector



Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace the connector.

STEP 4. Check cooling fan motor.

- Check cooling fan motor (Refer to GROUP 14 − On-vehicle Service − Cooling Fan Motor Check P.14-8).

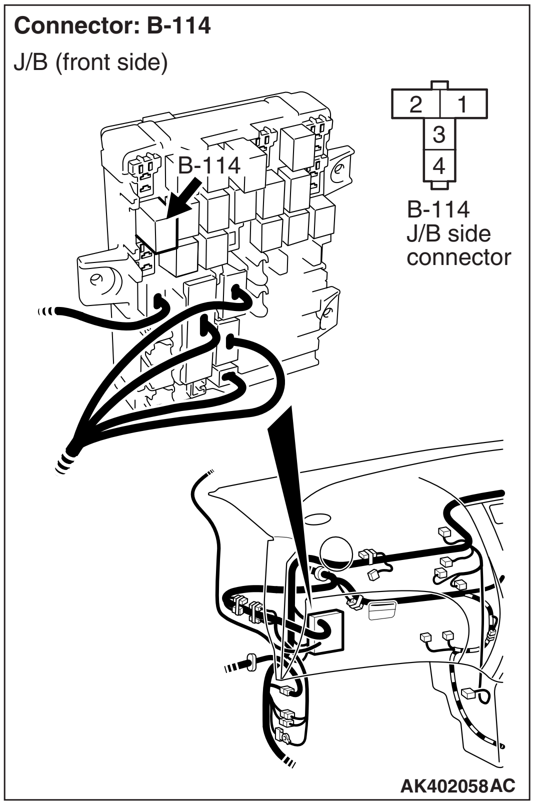
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace cooling fan motor.

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STEP 5. Perform voltage measurement at B-114 cooling fan control relay connector.



- Disconnect connector and measure at harness side.
- Voltage between terminal No. 3 and earth.

OK: System voltage

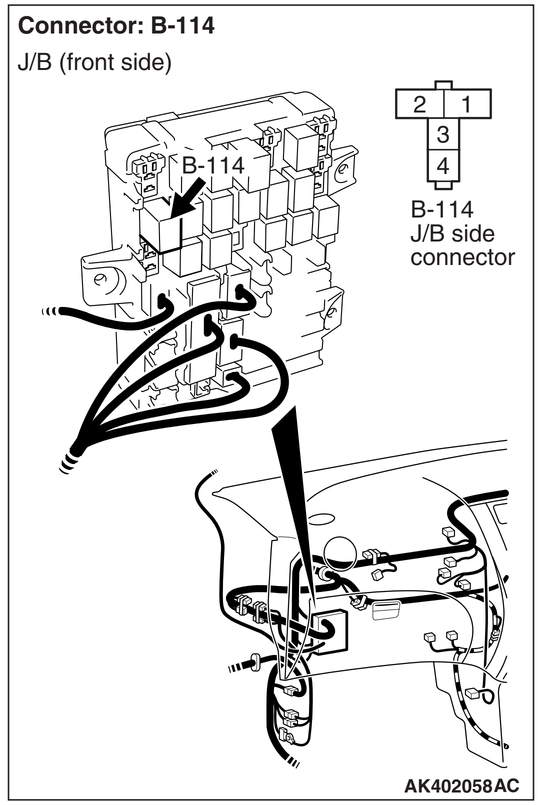
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Check intermediate connector B-108, and repair if necessary. If intermediate connector is normal, check and repair harness between B-114 (terminal No. 3) cooling fan control relay connector and battery.

- Check power supply line for open/short circuit.

STEP 6. Perform voltage measurement at B-114 fan control relay connector.



- Disconnect connector and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

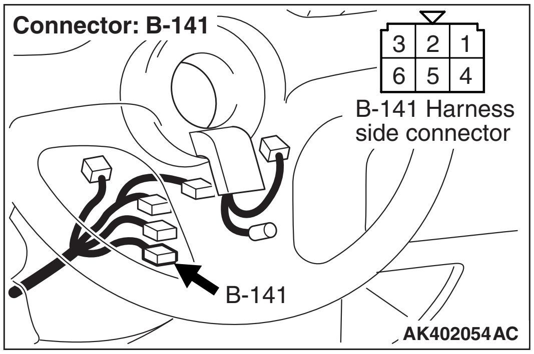
OK: System voltage

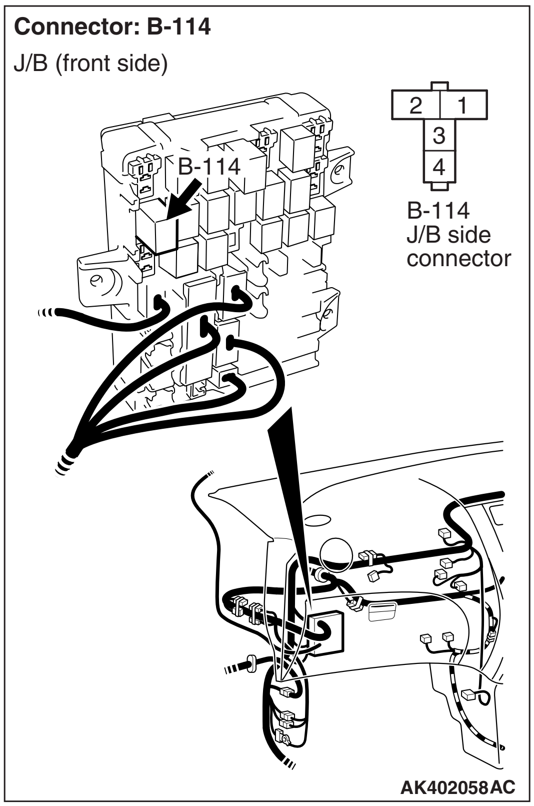
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Connector check: B-141 ignition switch connector





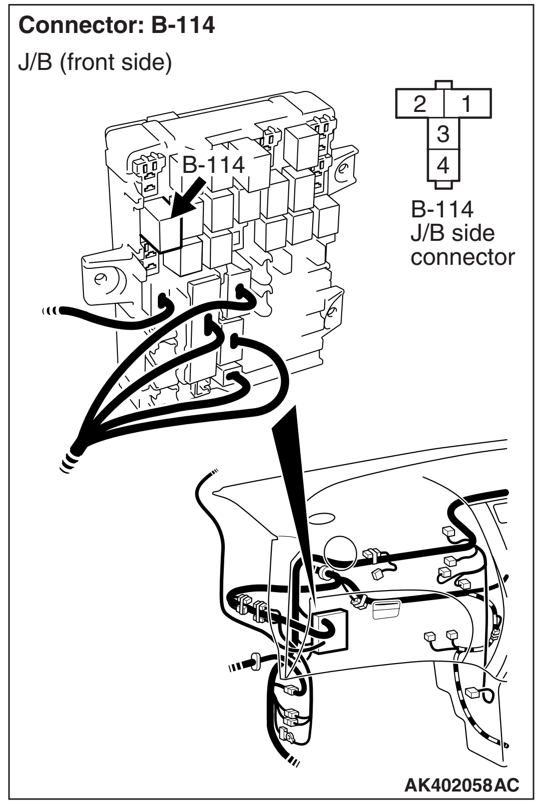
Q: Is the check result normal?

YES : Check intermediate connector B-130 and repair if necessary. If intermediate connector is normal, check and repair harness between B-114 (terminal No. 1) cooling fan control relay connector and B-141 (terminal No. 4) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 8. Check harness between battery and B-114 (terminal No. 3) cooling fan control relay connector.



NOTE: Before checking harness, check intermediate connector B-108, and repair if necessary.

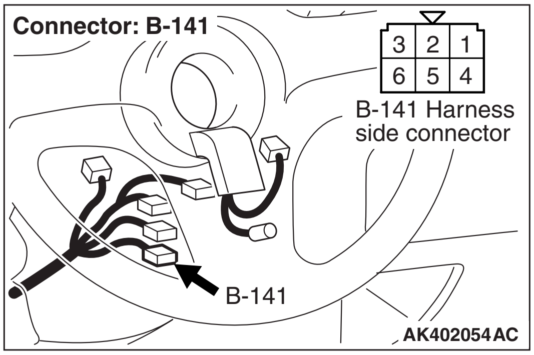
- Check power supply line for damage.

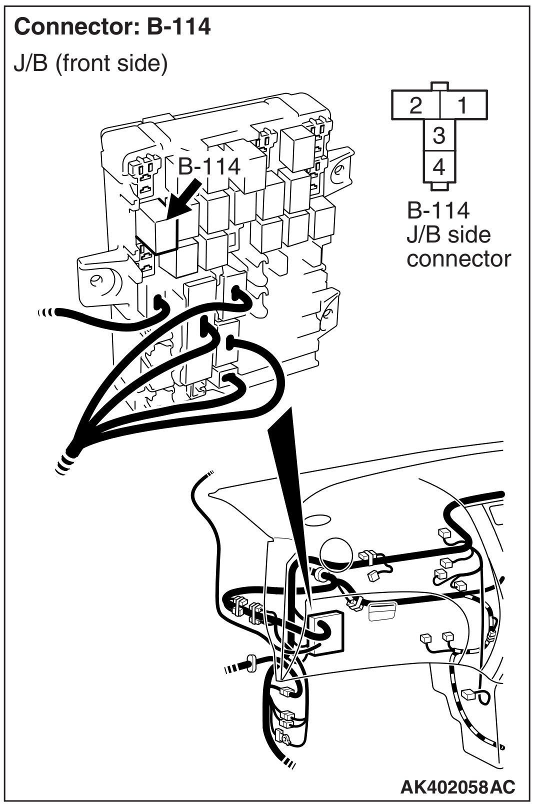
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Check harness between B-141 (terminal No. 4) ignition switch connector and B-114 (terminal No. 1) cooling fan control relay.





NOTE: Before checking harness, check intermediate connectors B-130 and repair if necessary.

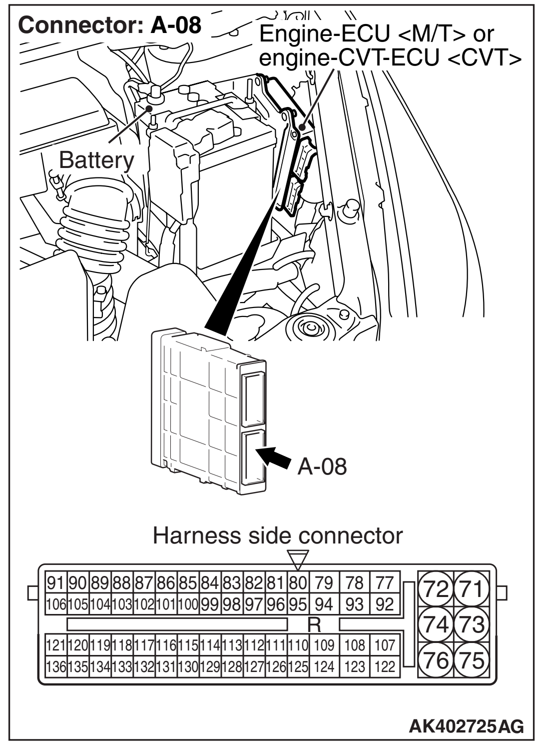
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

STEP 10. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



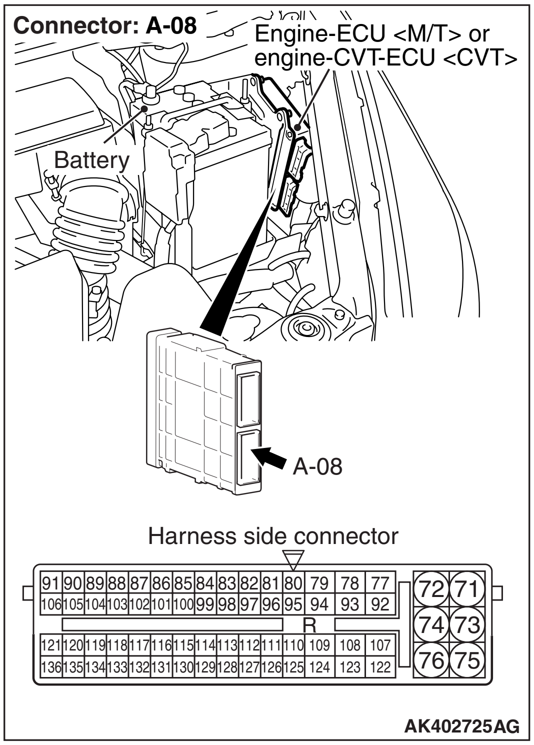
Q: Is the check result normal?

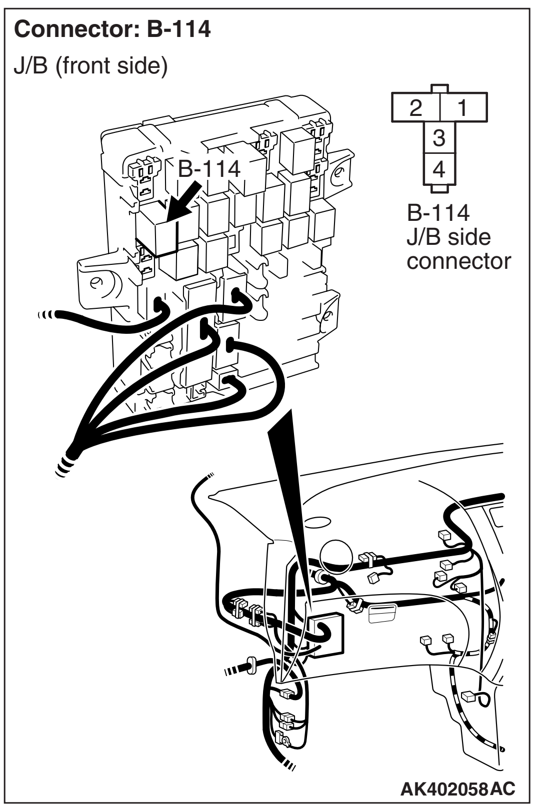
YES : Go to Step 11 .

NO : Repair or replace the connector.

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STEP 11. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.





- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 95 and earth.

OK: System voltage

Q: Is the check result normal?

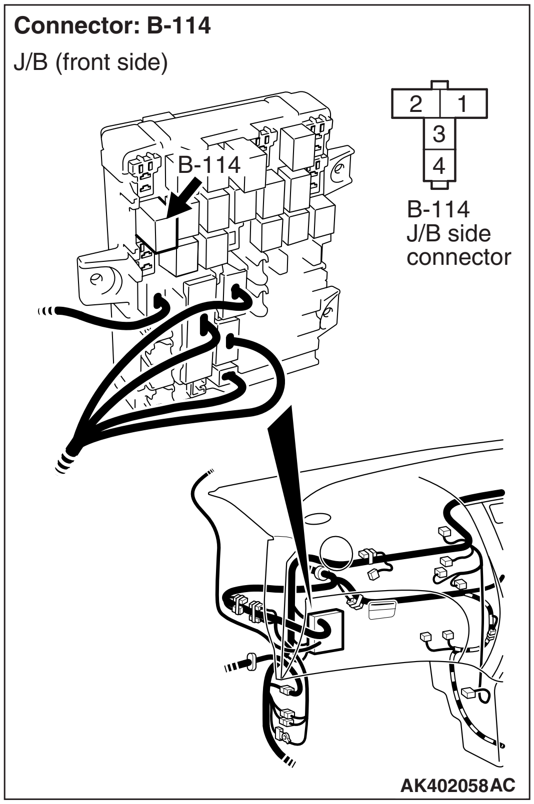
YES : Go to Step 12 .

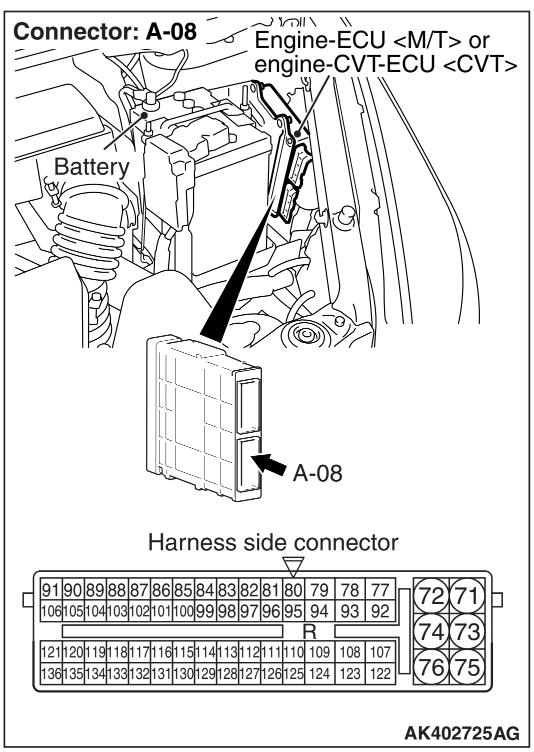
NO : Check intermediate connector B-110, and repair if necessary. If intermediate connector is normal, check and repair harness between B-114 (terminal No. 2) cooling fan control relay connector and A-08 (terminal No. 95) engine-ECU connector or engine-CVT-ECU connector.

- Check signal line for open/short circuit.

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STEP 12. Check harness between B-114 (terminal No. 2) cooling fan control relay connector and A-08 (terminal No. 95) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connector B-110, and repair if necessary.

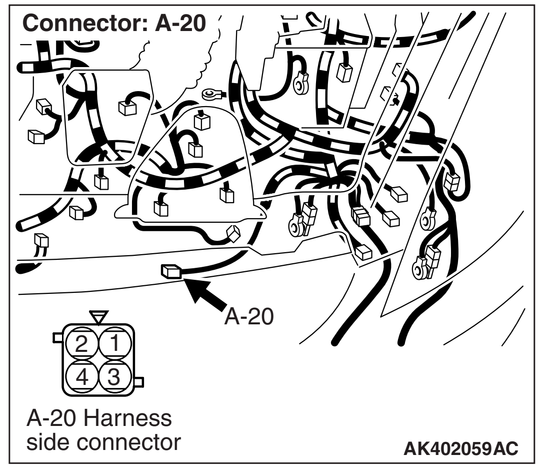
- Check signal line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair the damaged harness wire.

STEP 13. Perform resistance measurement at A-20 cooling fan motor connector.



- Disconnect connector and measure at harness side.
- Resistance between terminal No. 2 and earth.

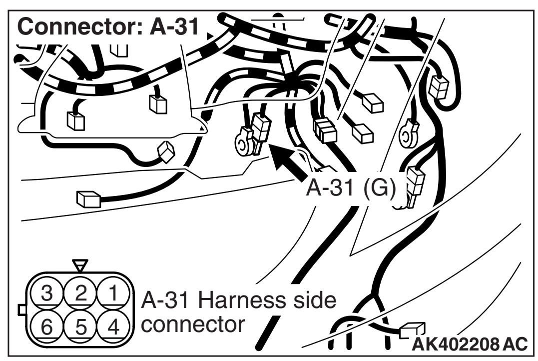
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 14.

STEP 14. Connector check: A-31 earth connector.



Q: Is the check result normal?

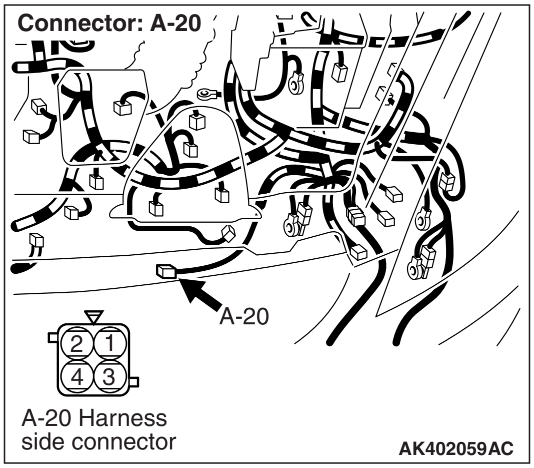
YES : Check and repair harness between A-20 (terminal No. 2) cooling fan motor connector and A-31 (terminal No. 2) earth connector.

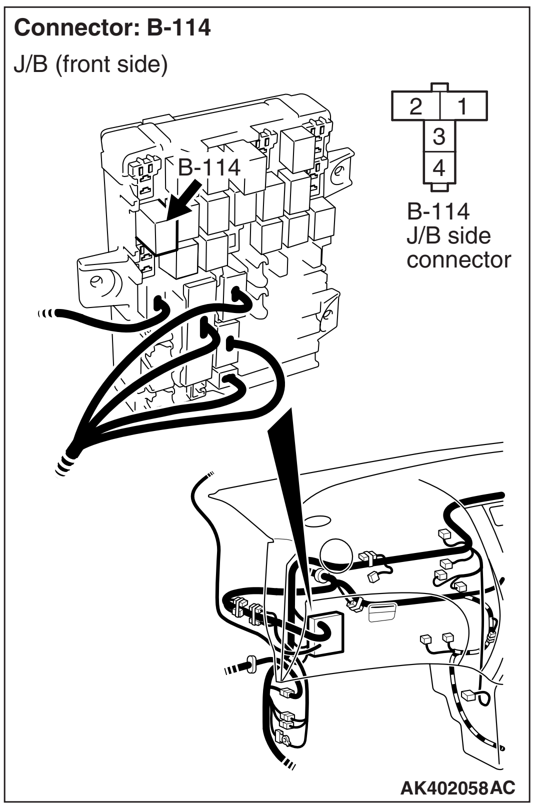
- Check earthing line for damage.

NO : Repair or replace the connector.

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STEP 15. Check harness between A-20 (terminal No. 1) cooling fan motor connector and B-114 (terminal No. 4) cooling fan control relay connector.





NOTE: Before checking harness, check intermediate connectors B-109, and repair if necessary.

- Check power supply line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair the damaged harness wire.

STEP 16. M.U.T.-III actuator test

- Refer to Actuator Test Reference Table P.13A-341.
  a. Item 20: Cooling fan motor

Q: Are the check results normal?

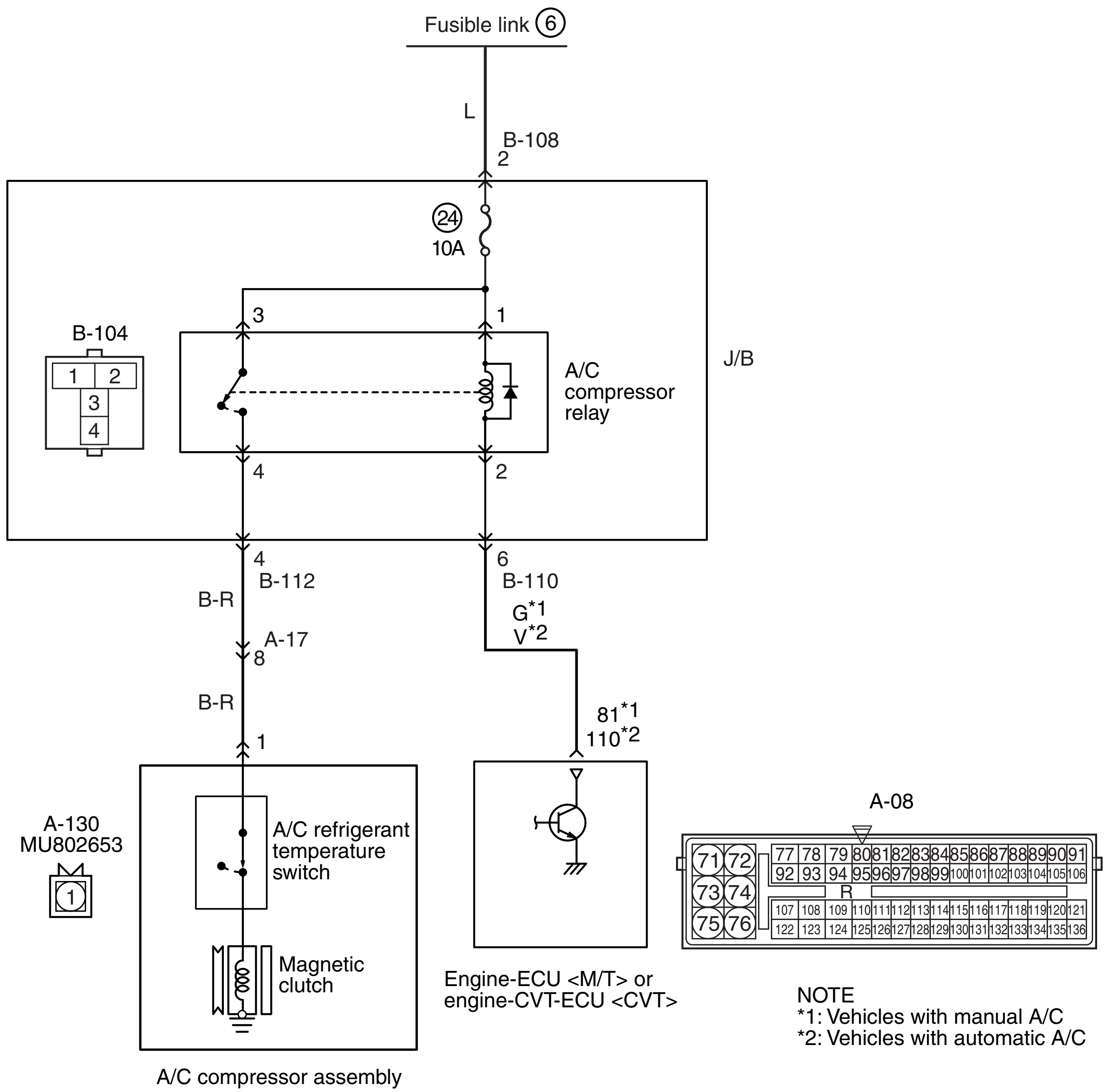
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Inspection Procedure 26: A/C compressor relay system

A/C Compressor Relay Circuit



Wire colour code
B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray
R: Red P: Pink V: Violet PU: Purple

AK402705AE

OPERATION

- The battery voltage is applied to the A/C compressor relay (terminal No. 1 and No. 3).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 81*1 or No. 110*2) makes the power transistor in the unit be in ON position and makes currents go on the A/C compressor relay coil, and that makes the relay be in ON position.
- When the A/C compressor is in ON position, the battery voltage is supplied to the A/C compressor (terminal No. 4) from the A/C compressor relay assembly (terminal No. 1).

FUNCTION

- When the A/C switch ON signal is input to the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the engine-ECU <M/T> or engine-CVT-ECU <CVT> places the A/C compressor relay in the ON position. Accordingly, the battery voltage supplied to the A/C compressor operates the magnet clutch.

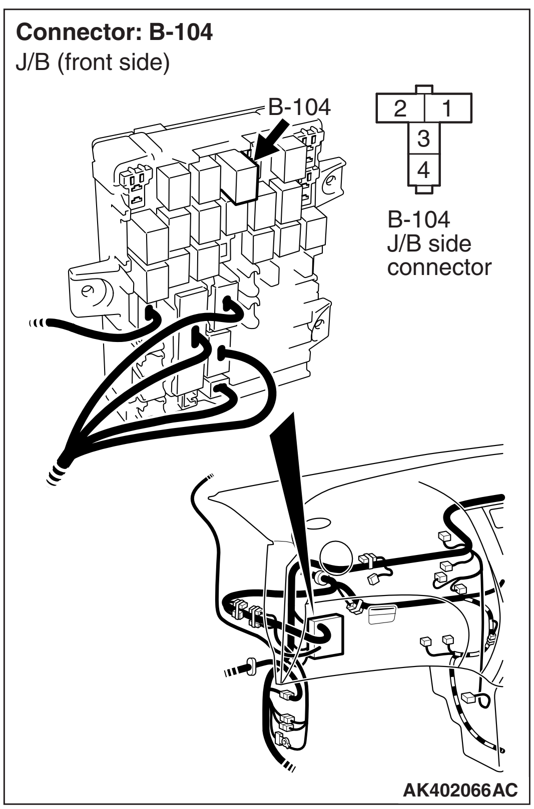
PROBABLE CAUSES

- Failed A/C compressor relay
- Failed A/C compressor
- Open/short/damaged circuit in A/C compressor relay circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

NOTE:
**1: Vehicles with manual A/C*
**2: Vehicles with automatic A/C*

STEP 1. Connector check: B-104 A/C compressor relay connector



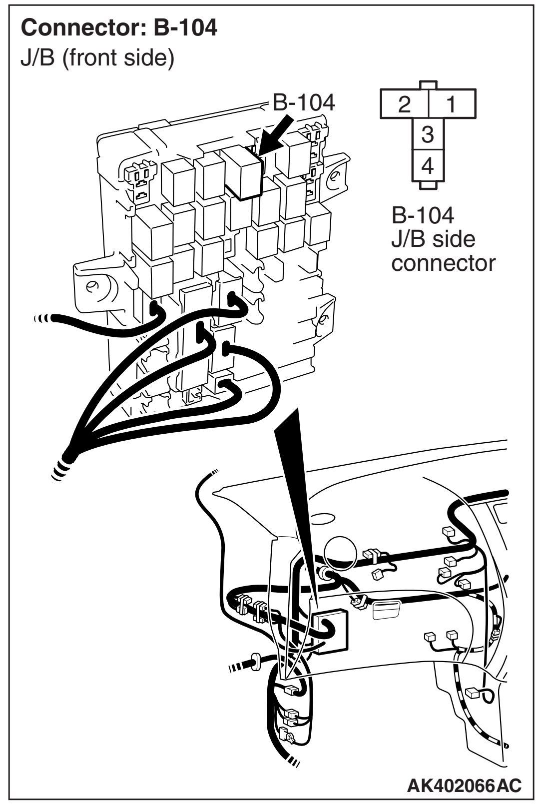
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. A/C compressor relay check.

- Check A/C compressor relay (Refer to GROUP 55 − On-vehicle Service − Power Relay Check P.55A-52).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace A/C compressor relay.

STEP 3. Perform voltage measurement at B-104 A/C compressor assembly connector.



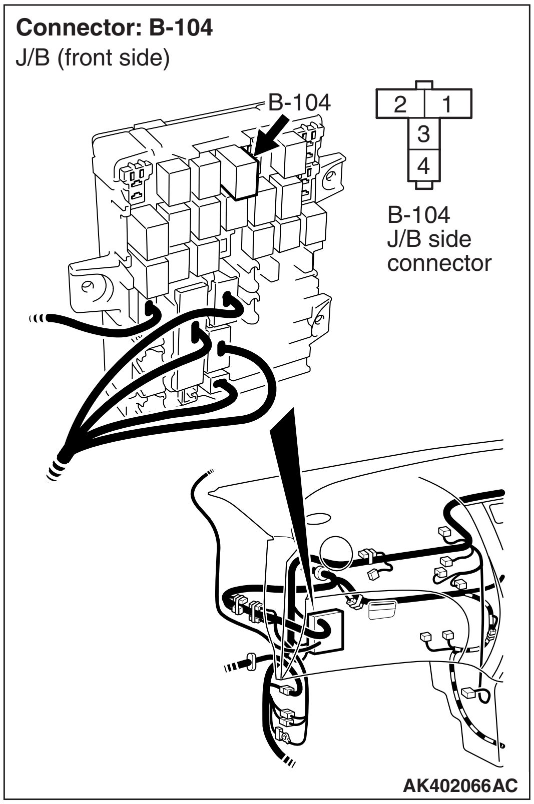
- Disconnect connector, and measure at harness side.
- Voltage between terminal No. 1, No. 3 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Check intermediate connector B-108, and repair if necessary. If intermediate connector is normal, check and repair harness between B-104 (terminal No. 1 and No. 3) A/C compressor assembly connector and battery.
  - Check power line for open/short circuit.

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STEP 4. Check harness between battery and B-104 (terminal No. 1 and No. 3) A/C compressor relay connector.



NOTE: Before checking harness, check intermediate connector B-108, and repair if necessary.

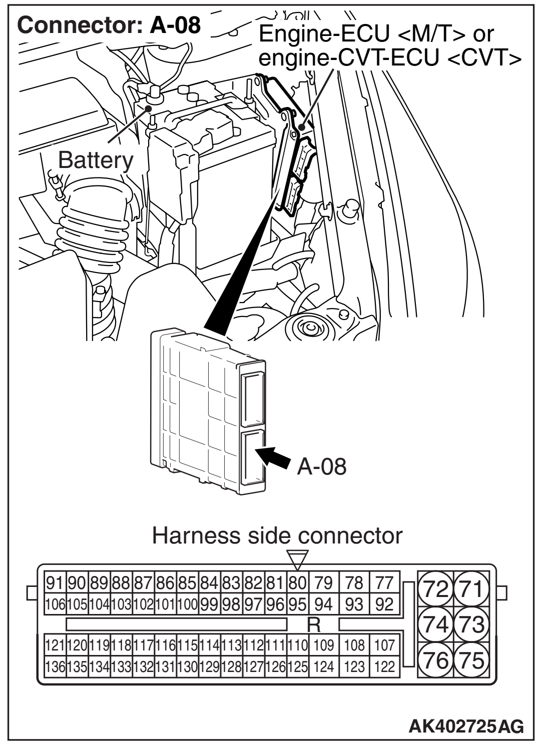
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair the damaged harness wire.

STEP 5. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector



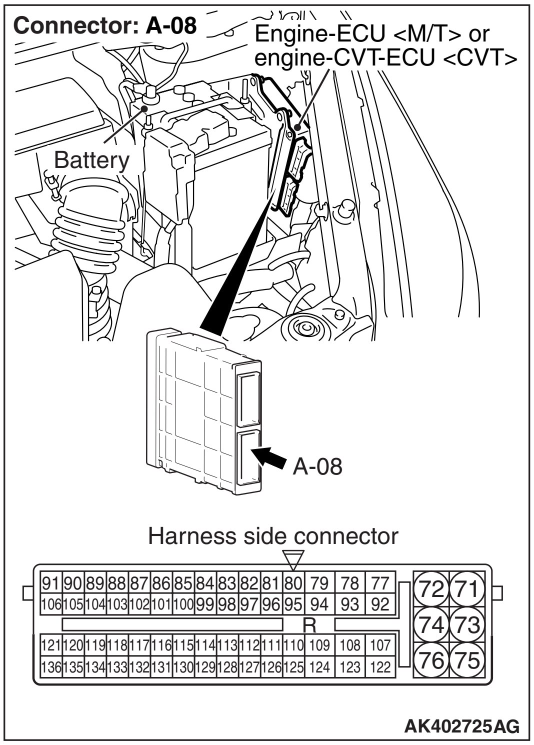
Q: Is the check result normal?

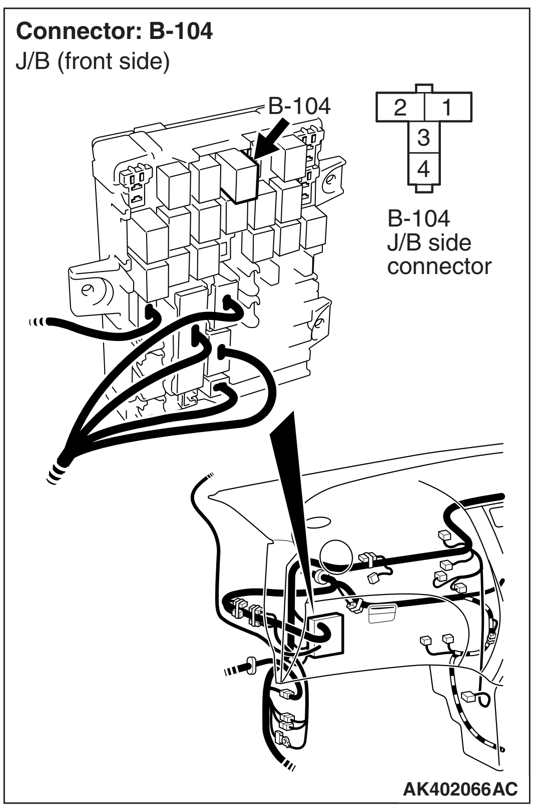
YES : Go to Step 6 .

NO : Repair or replace the connector.

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STEP 6. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.





- Disconnect connector, and measure at harness side.
- Voltage between terminal No. 81*1 or No. 110*2 and earth.

OK: System voltage

Q: Is the check result normal?

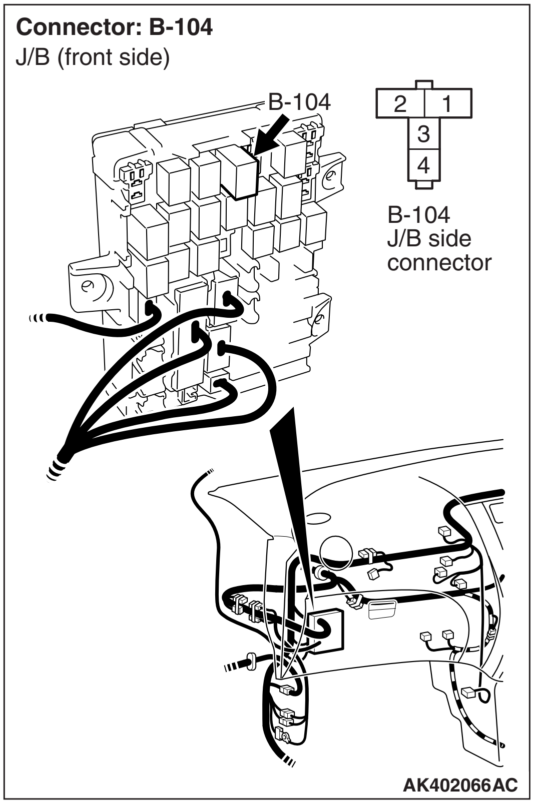
YES : Go to Step 7 .

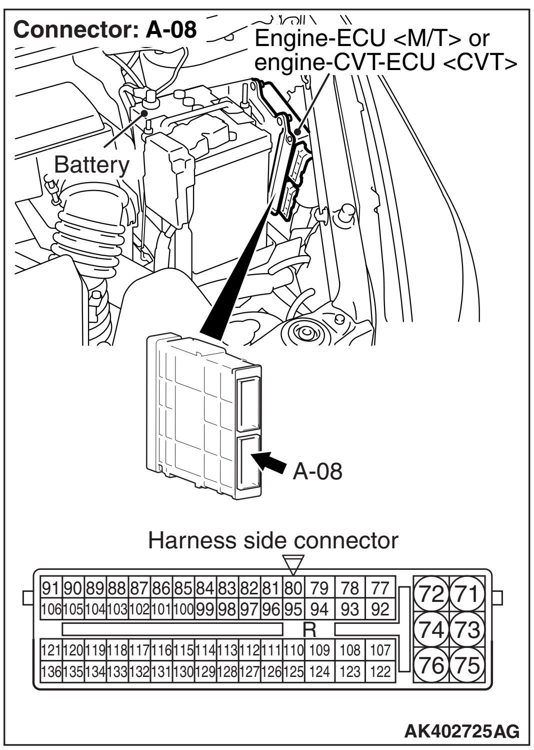
NO : Check intermediate connector B-110, and repair if necessary. If intermediate connector is normal, check and repair harness between B-104 (terminal No. 2) A/C compressor relay connector and A-08 (terminal No. 81*1 or No. 110*2) engine-ECU connector or engine-CVT-ECU connector.

- Check signal line for open/short circuit.

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STEP 7. Check harness between B-104 (terminal No. 2) A/C compressor relay connector and A-08 (terminal No. 81*1 or No. 110*2) engine-ECU connector or engine-CVT-ECU connector.





NOTE: Before checking harness, check intermediate connector B-110, and repair if necessary.

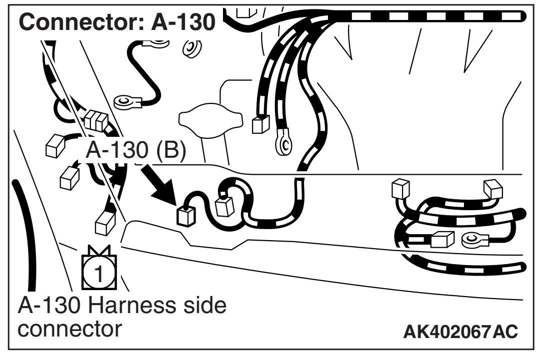
- Check signal line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. Connector check: A-130 A/C compressor relay connector



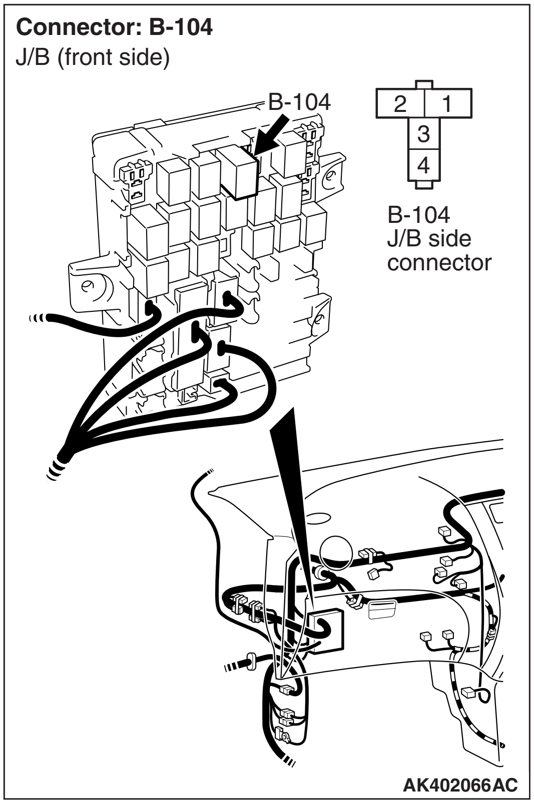
Q: Is the check result normal?

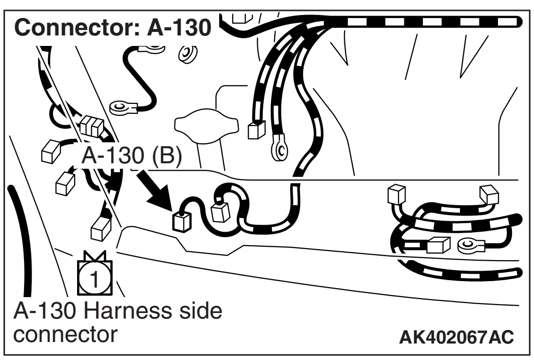
YES : Go to Step 9 .

NO : Repair or replace the connector.

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STEP 9. Check harness between B-104 (terminal No. 4) A/C compressor relay connector and A-130 (terminal No. 1) A/C compressor connector.





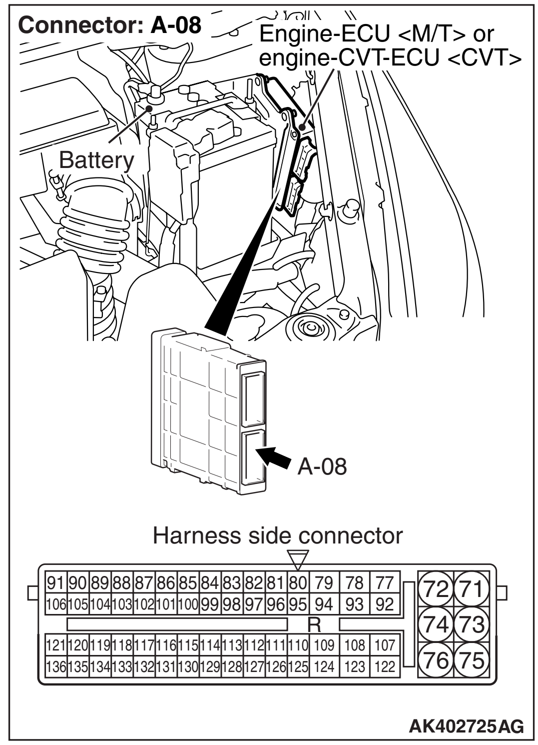
NOTE: Before checking harness, check intermediate connector B-112, A-17, and repair if necessary.

- Check power supply line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair the damaged harness wire.

STEP 10. Confirmation of A/C compressor driving.



- Disconnect A-08 engine-ECU connector or engine-CVT-ECU connector, and terminal No. 81[*1] or No. 110[*2] is earth short-circuited.

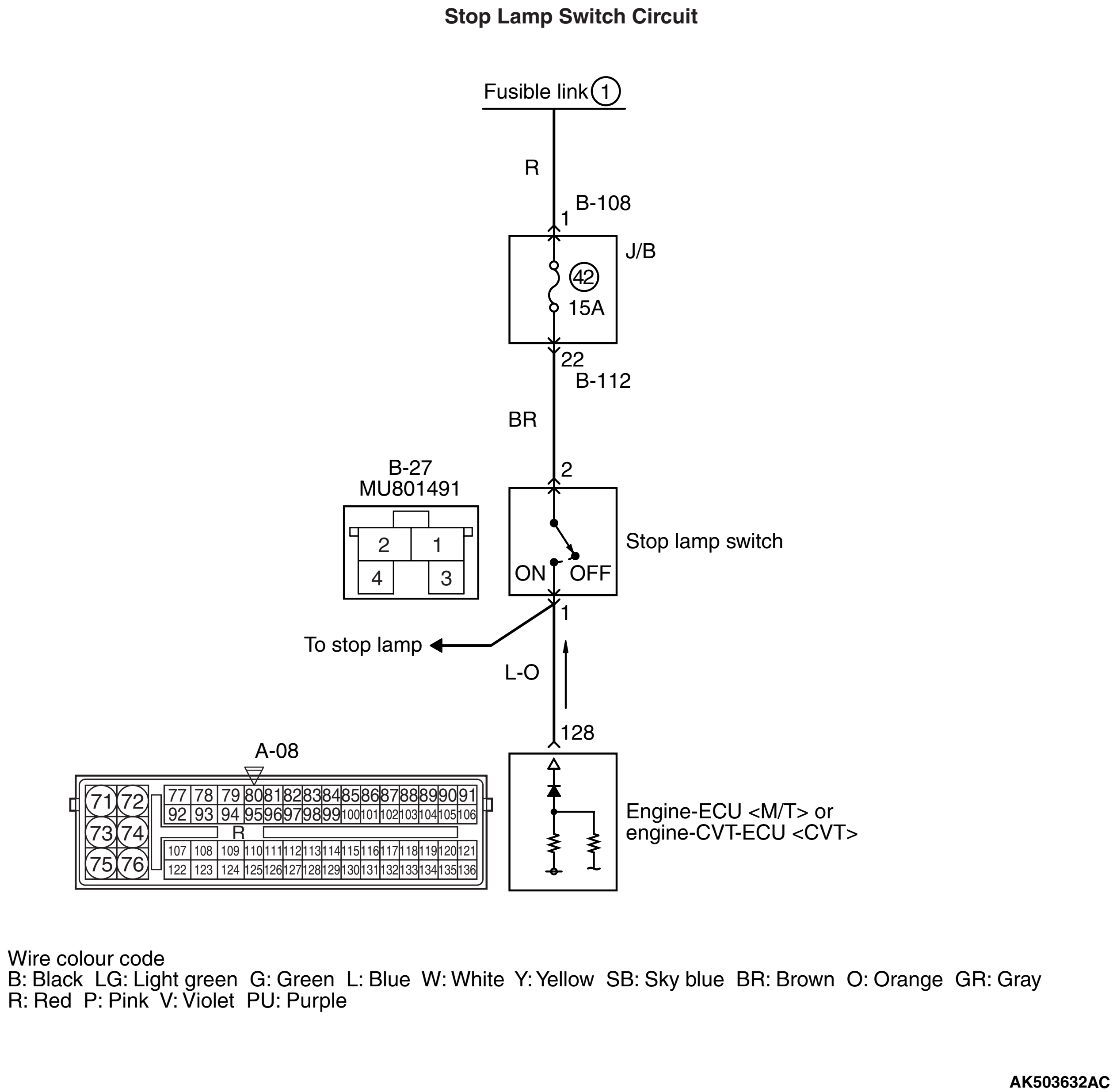
OK: The A/C compressor drives

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.
NO : Replace A/C compressor.

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Inspection Procedure 27: Stop lamp switch system



OPERATION

- The battery voltage is applied to the stop lamp switch (terminal No. 2).
- The stop lamp switch output terminal (terminal No. 1) inputs the switch signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 128).

FUNCTION

- The system checks whether the vehicle has the illuminating stop lamp or not, and inputs the signal to the engine-ECU <M/T> or engine-CVT-ECU <CVT>. The engine-ECU <M/T> or engine-CVT-ECU <CVT> knows the vehicle state through the stop lamp switch signal and carries out control of the each system.

POSSIBLE CAUSES

- Failed stop lamp switch
- Open/short circuit in stop lamp switch or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

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DIAGNOSIS PROCEDURE

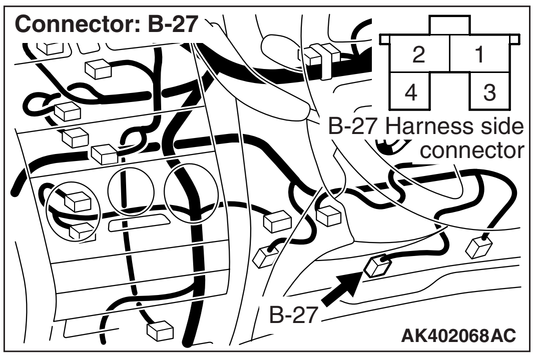
STEP 1. Check for height of brake pedal.

- Check for height of brake pedal (Refer to GROUP 35A – On-vehicle Service – Brake Pedal Check And Adjustment P.35A-7).

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Adjust.

STEP 2. Connector check: B-27 stop lamp switch connector



Q: Is the check result normal?

YES : Go to Step 3 .
NO : Repair or replace the connector.

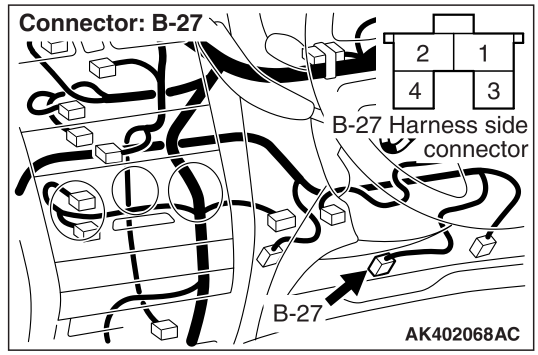
STEP 3. Check the stop lamp switch.

- Check the stop lamp switch (Refer to GROUP 35A – Brake Pedal Inspection P.35A-22).

Q: Is the check result normal?

YES : Go to Step 4 .
NO : Replace stop lamp switch.

STEP 4. Perform voltage measurement at B-27 stop lamp switch connector



- Disconnect the connector and measure it at harness side.
- Voltage between terminal No. 2 and earth.

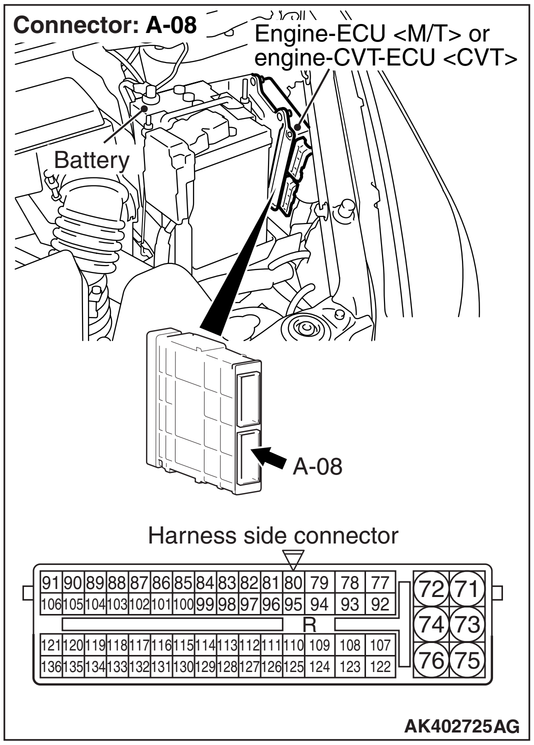
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Check for the intermediate connectors B-112 and B-108 and repair if necessary. If intermediate connectors are normal, check and repair harness between B-27 (terminal No. 2) stop lamp switch connector and battery.

- Check power supply line open/short circuit supply.

STEP 5. Connector check: A-08 engine-ECU connector or engine-CVT-ECU connector

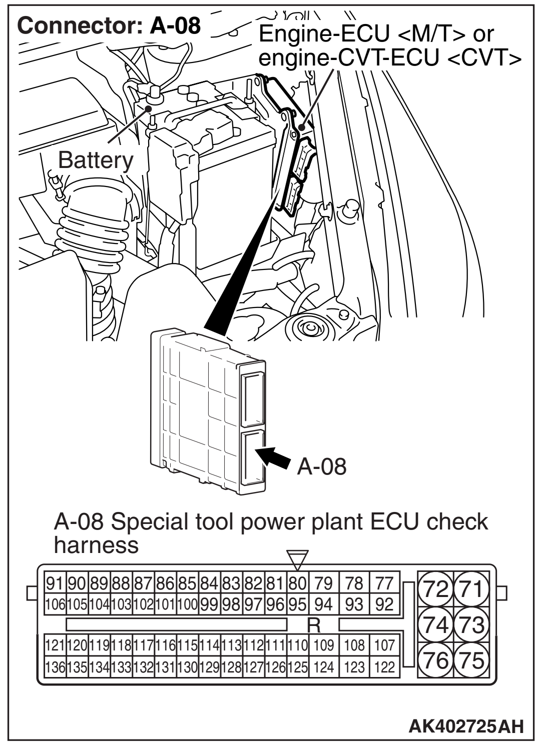


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at A-08 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect the engine-ECU connector or engine-CVT-ECU connector and connect the special tool power plant ECU check harness (MB991987), and then measure the voltage at check connector.
- Voltage between terminal No. 128 and the earth.

OK:
System voltage (Brake pedal: Depressed)
1 V or less (Brake pedal: Released)

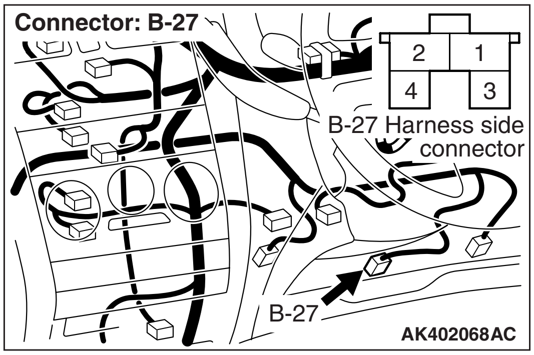
Q: Is the check result normal?

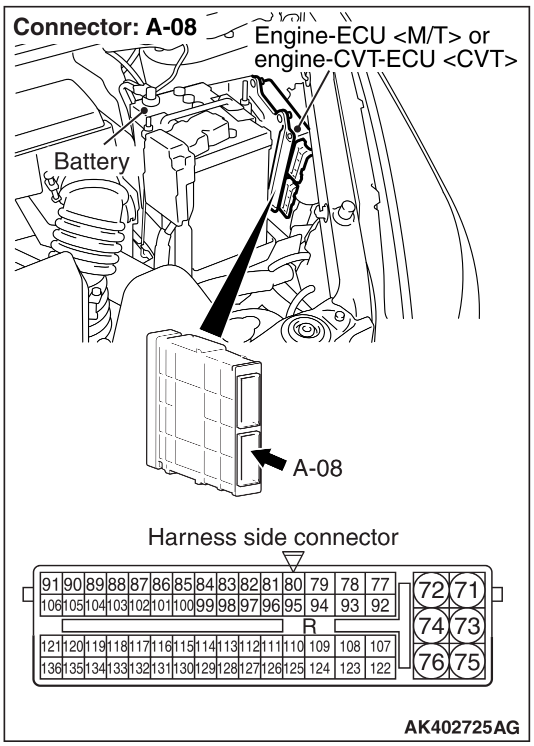
YES : Go to Step 8 .

NO : Go to Step 7 .

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STEP 7. Check harness between B-27 (terminal No. 1) stop lamp switch connector and A-08 (terminal No. 128) engine-ECU connector or engine-CVT-ECU connector.





- Check output line open/short circuit and damage.

Q: Is the check result normal?

YES : For a short circuit, check and repair harness and the connector for the stop lamp switch output signal.

NO : Repair.

STEP 8. M.U.T.-III data list

- Refer to Data List Reference Table P.13A-331.
  a. Item 67: Stop lamp switch

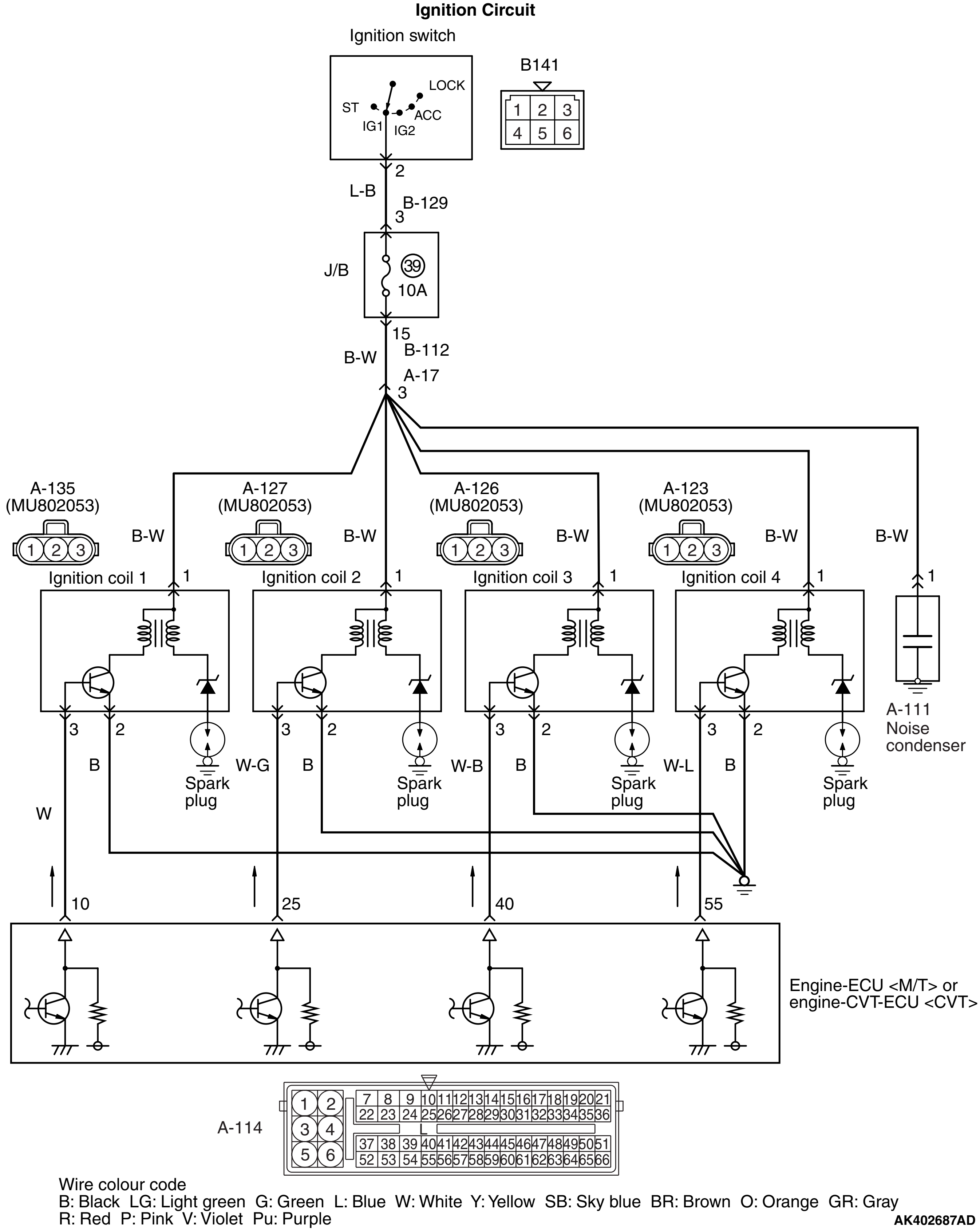
Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Inspection Procedure 28: Ignition circuit system



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OPERATION

- The battery voltage is applied to the ignition coil (terminal No. 1) from the ignition switch and is earthed to the vehicle body from the ignition coil (terminal No. 2).
- A power voltage of 12 V is applied to the ignition coil output terminal (terminal No. 3) from the engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminals No. 10, No. 25, No. 40 and No. 55).

FUNCTION

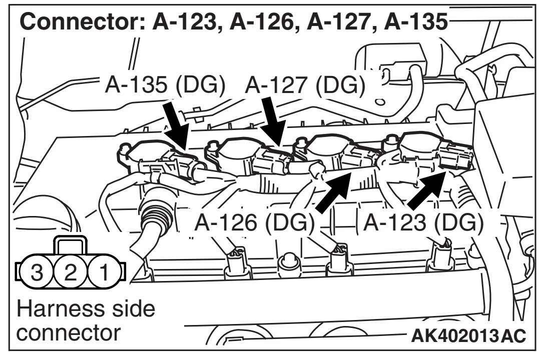
- When the engine-ECU <M/T> or engine-CVT-ECU <CVT> makes the power transistor in the unit be in OFF position, the battery voltage in the unit is applied to the power transistor unit, and that makes the power transistor unit be in ON position. The engine-ECU <M/T> or engine-CVT-ECU <CVT> makes the power transistor in the unit be in ON, and that makes the power transistor unit be in OFF position.
- In response to the signal from the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the power transistor unit is in ON position. The primary current is going to the ignition coil. When the power transistor unit is in OFF position, the primary current is interrupted and high voltage is generated in the secondary coil.

PROBABLE CAUSES

- Failed ignition coil
- Failed spark plug
- Open/short/damaged circuit in ignition primary circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-123, A-126, A-127 and A-135 ignition coil connectors



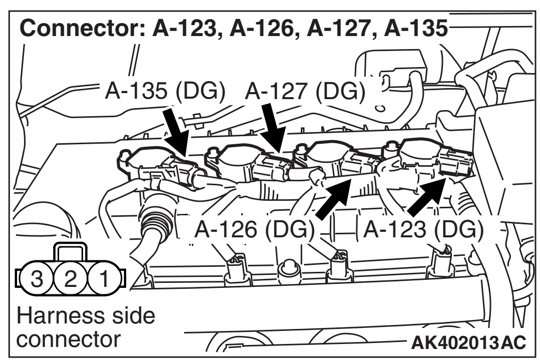
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service – Ignition Coil Check P.16-34).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace ignition coil.

STEP 3. Perform voltage measurement at A-123, A-126, A-127 and A-135 ignition coil connectors.



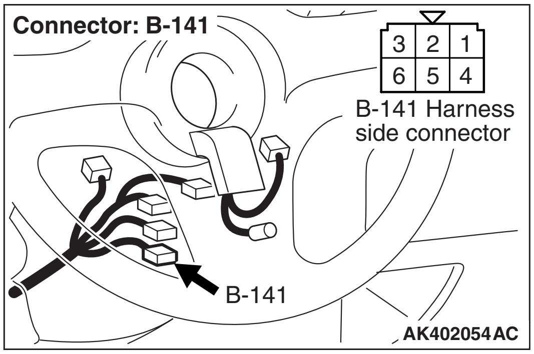
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

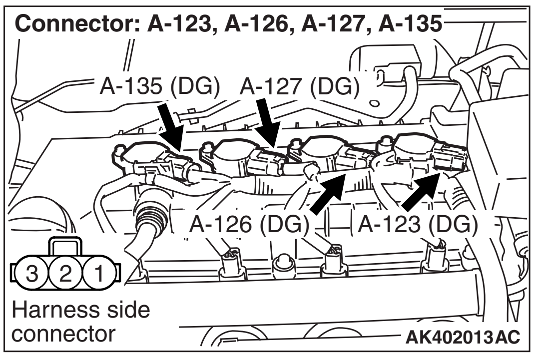
OK: System voltage

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 4 .

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STEP 4. Connector check: B-141 ignition switch connector





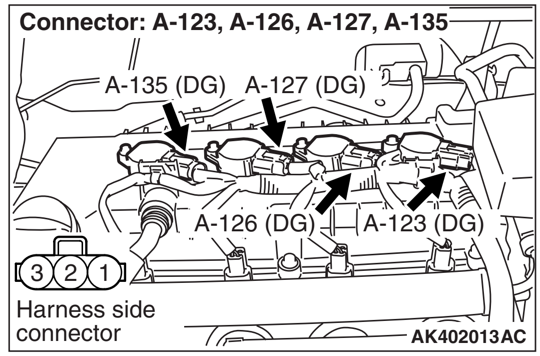
Q: Is the check result normal?

YES : Check intermediate connectors A-17, B-112 and B-129, and repair if necessary. If intermediate connectors are normal, check and repair harness between ignition switch connector and ignition coil connector.

a. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-135 (terminal No. 1) No. 1 ignition coil connector.
b. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-127 (terminal No. 1) No. 2 ignition coil connector.
c. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-126 (terminal No. 1) No. 3 ignition coil connector.
d. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-123 (terminal No. 1) No. 4 ignition coil connector.
- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform resistance measurement at A-123, A-126, A-127 and A-135 ignition coil connectors.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

OK: Continuity (2 Ω or less)

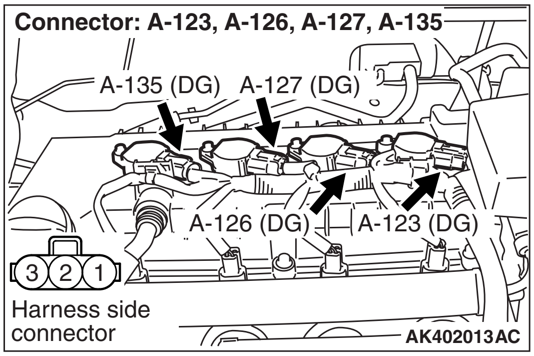
Q: Is the check result normal?

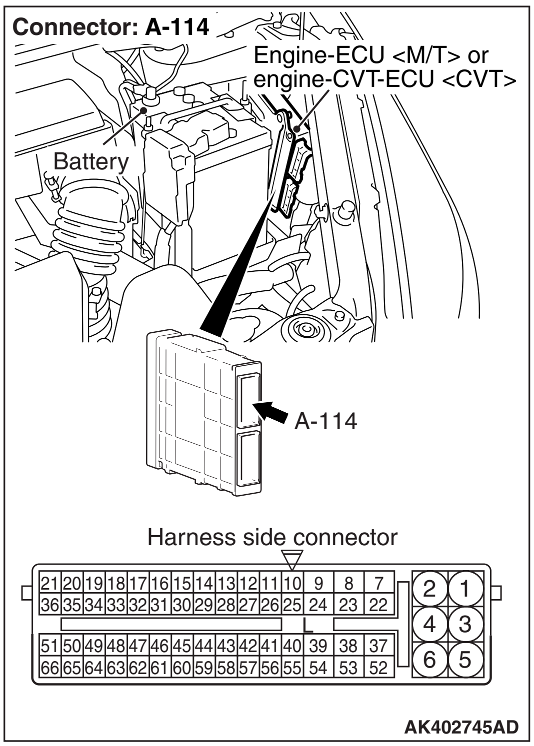
YES : Go to Step 6 .

NO : Check and repair harness between ignition coil connector and body earth

a. Check and repair harness between A-135 (terminal No. 2) No. 1 ignition coil connector and body earth.
b. Check and repair harness between A-127 (terminal No. 2) No. 2 ignition coil connector and body earth.
c. Check and repair harness between A-126 (terminal No. 2) No. 3 ignition coil connector and body earth.
d. Check and repair harness between A-123 (terminal No. 2) No. 4 ignition coil connector and body earth.
- Check earthing line for open circuit and damage.

STEP 6. Check harness between ignition coil connector and engine-ECU connector or engine-CVT-ECU connector.

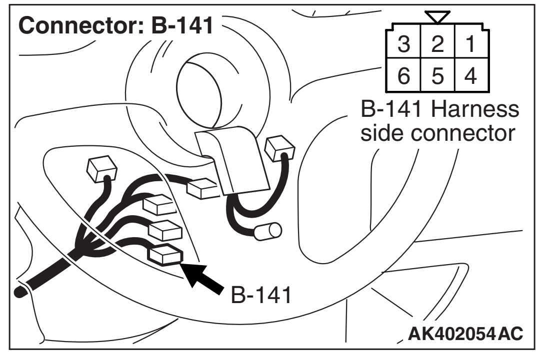


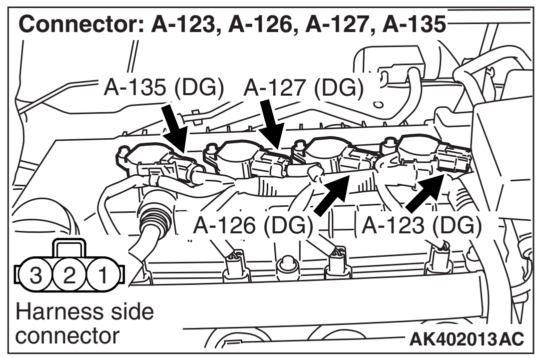


a. Check and repair harness between A-135 (terminal No. 3) No. 1 ignition coil connector and A-114 (terminal No. 10) engine-ECU connector or engine-CVT-ECU connector.
b. Check and repair harness between A-127 (terminal No. 3) No. 2 ignition coil connector and A-114 (terminal No. 25) engine-ECU connector or engine-CVT-ECU connector.
c. Check and repair harness between A-126 (terminal No. 3) No. 3 ignition coil connector and A-114 (terminal No. 40) engine-ECU connector or engine-CVT-ECU connector.
d. Check and repair harness between A-123 (terminal No. 3) No. 4 ignition coil connector and A-114 (terminal No. 55) engine-ECU connector or engine-CVT-ECU connector.
   - Check signal line for short circuit and damage.

Q: Are the check results normal?
YES : Go to Step 7 .
NO : Repair the damaged harness wire.

STEP 7. Check harness between ignition switch connector and ignition coil connector.





NOTE: Before checking harness, check intermediate connectors A-17, B-112 and B-129, and repair if necessary.

a. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-135 (terminal No. 1) No. 1 ignition coil connector.
b. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-127 (terminal No. 1) No. 2 ignition coil connector.
c. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-126 (terminal No. 1) No. 3 ignition coil connector.
d. Check and repair harness between B-141 (terminal No. 2) ignition switch connector and A-123 (terminal No. 1) No. 4 ignition coil connector.
   - Check power supply line for damage.

Q: Are the check results normal?
YES : Go to Step 8 .
NO : Repair the damaged harness wire.

STEP 8. Check ignition coil spark.

Q: Is the check result normal?
YES : Replace spark plug.
NO : Go to Step 9 .

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STEP 9. Replace ignition coil.

- After replacing the ignition coil, re-check the trouble symptoms.

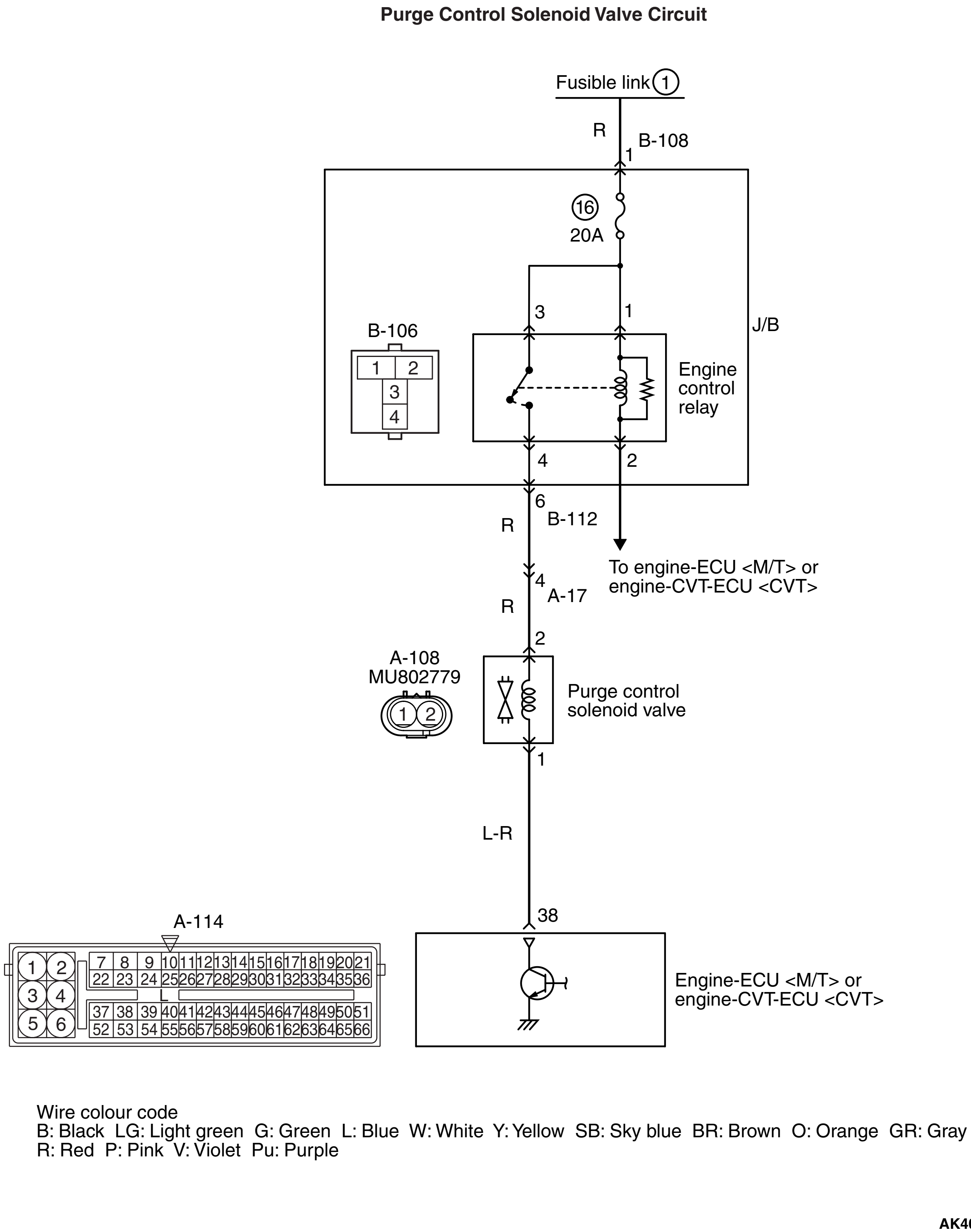
Q: Dose trouble symptom persist?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

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Inspection Procedure 29: Purge control solenoid valve system



OPERATION

- Power is supplied to the purge control solenoid valve (terminal No. 2) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-CVT-ECU <CVT> (terminal No. 38) makes the power transistor in the unit be in ON position, and that makes currents go on the purge control solenoid valve (terminal No. 1).

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FUNCTION

- In response to a signal from the engine-ECU <M/T> or engine-CVT-ECU <CVT>, the purge control solenoid valve controls the flow rate of the purge air to be introduced into the surge tank.

PROBABLE CAUSES

- Failed purge control solenoid valve
- Open/short/damaged circuit in purge control solenoid value circuit or loose connector contact
- Failed engine-ECU <M/T> or engine-CVT-ECU <CVT>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III actuator test

- Item 08: Purge control solenoid valve

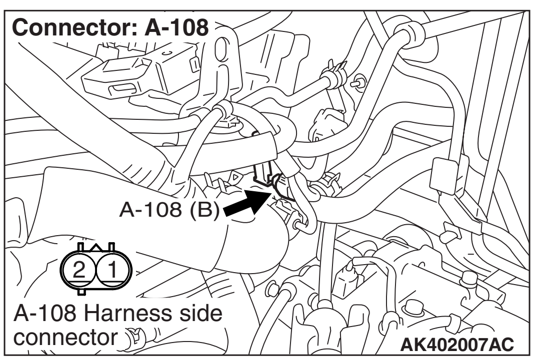
OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: A-108 purge control solenoid valve connector

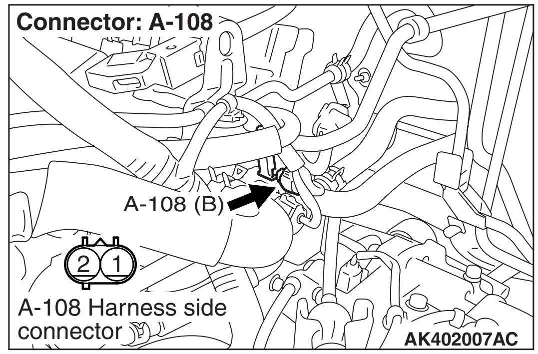


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at A-108 purge control solenoid valve connector.



- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.

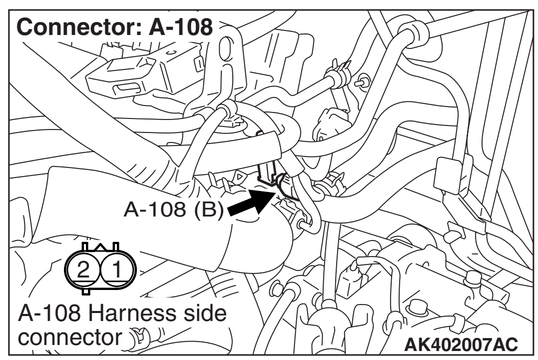
OK: 30 – 34 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace purge control solenoid valve.

STEP 4. Perform voltage measurement at A-108 purge control solenoid valve connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: System voltage

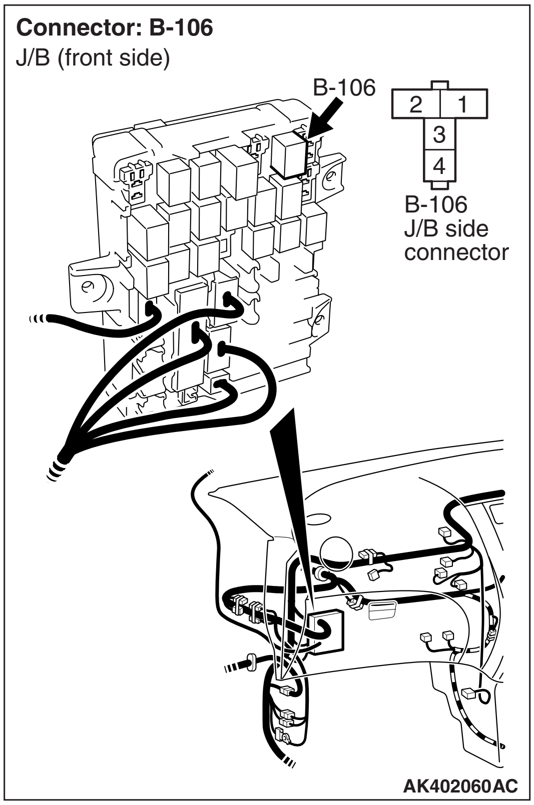
Q: Is the check result normal?

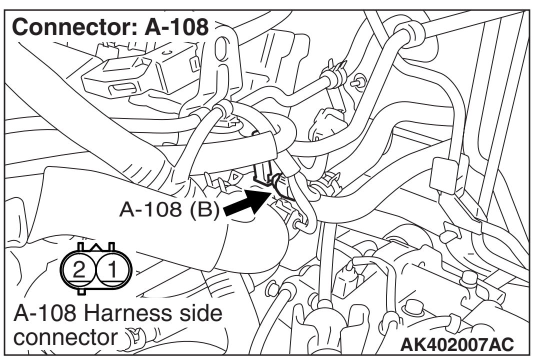
YES : Go to Step 6 .

NO : Go to Step 5 .

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STEP 5. Connector check: B-106 engine control relay connector





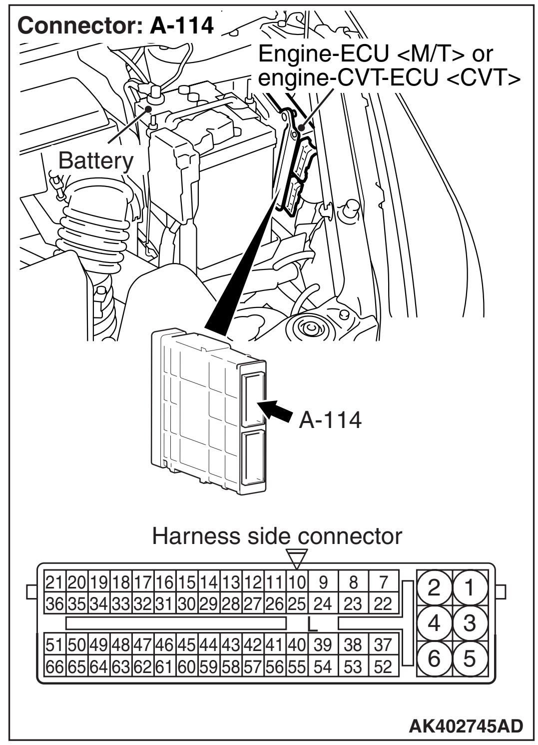
Q: Is the check result normal?

YES : Check intermediate connector A-17, B-112, and repair if necessary. If intermediate connector is normal, check and repair harness between A-108 (terminal No. 2) purge control solenoid valve connector and B-106 (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at A-114 engine-ECU connector or engine-CVT-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

OK: System voltage

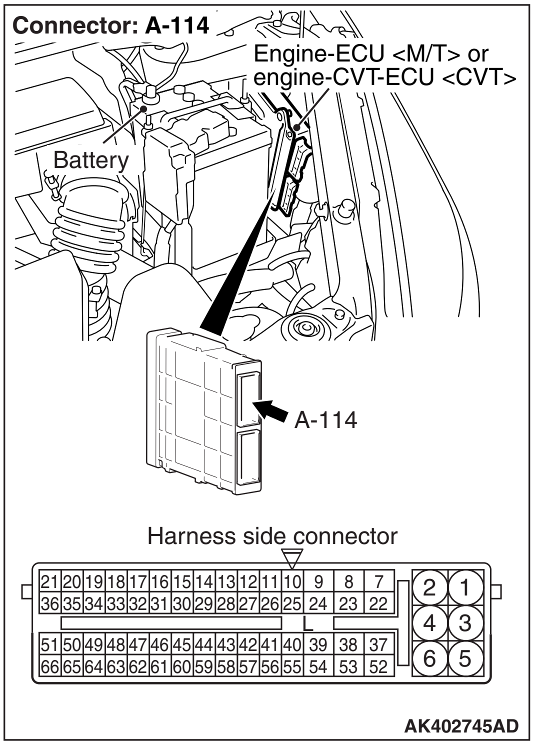
Q: Is the check result normal?

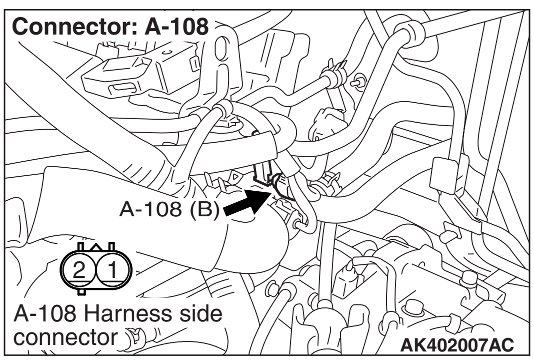
YES : Go to Step 8 .

NO : Go to Step 7 .

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STEP 7. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector





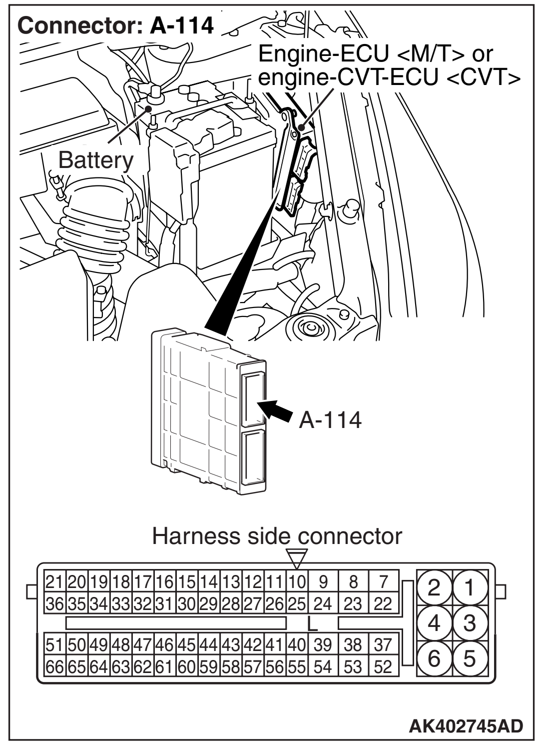
Q: Is the check result normal?

YES : Check and repair harness between A-108 (terminal No. 1) purge control solenoid valve connector and A-114 (terminal No. 38) engine-ECU connector or engine-CVT-ECU connector.

- Check output line for open/short circuit.

NO : Repair or replace the connector.

STEP 8. Connector check: A-114 engine-ECU connector or engine-CVT-ECU connector



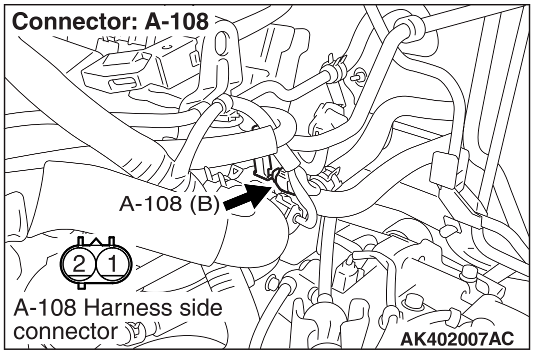
Q: Is the check result normal?

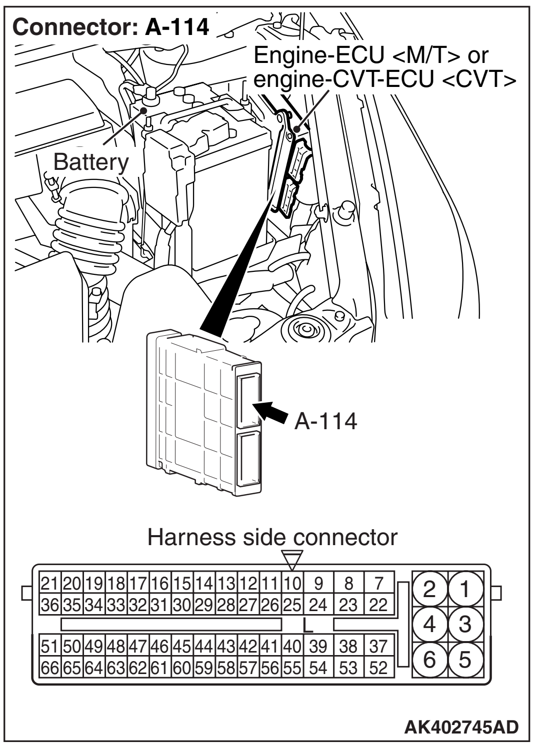
YES : Go to Step 9 .

NO : Repair or replace the connector.

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STEP 9. Check harness between A-108 (terminal No. 1) purge control solenoid valve connector and A-114 (terminal No. 38) engine-ECU connector or engine-CVT-ECU connector.

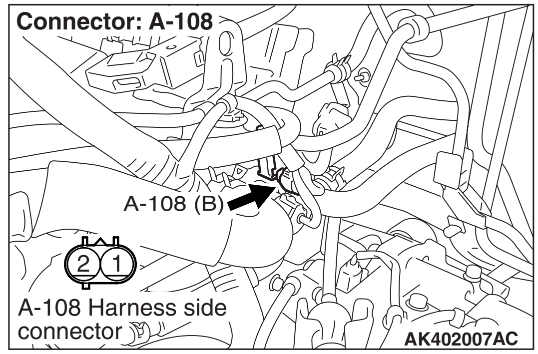


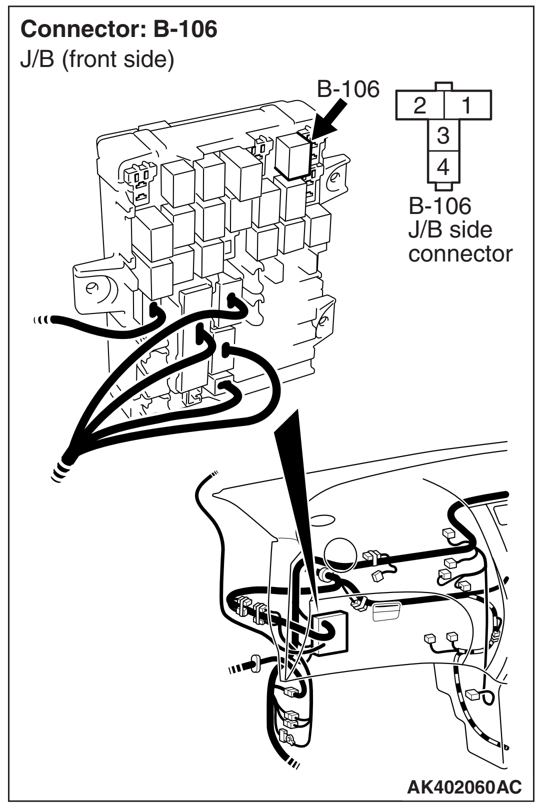


- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 10 .
NO : Repair the damaged harness wire.

STEP 10. Check harness between A-108 (terminal No. 2) purge control solenoid valve connector and B-106 (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector A-17, B-112, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Repair the damaged harness wire.

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STEP 11. M.U.T.-III actuator test

- Item 08: purge control solenoid valve

OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).

NO : Replace engine-ECU <M/T> or engine-CVT-ECU <CVT>.

Data List Reference Table

M1131152002601

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	200 mV or less	Code No. P0130	P.13A-62
			At excessive acceleration	600 – 1,000 mV		
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-CVT-ECU <CVT>.	Idle operation	400 mV or less ⇔ 600 – 1,000 mV (altered)		
			2,500 r/min			
13	Intake air temperature sensor	Ignition switch: ON or engine running	Intake air temperature: –20°C	–20°C	Code No. P0110	P.13A-34
			Intake air temperature: 0°C	0°C		
			Intake air temperature: 20°C	20°C		
			Intake air temperature: 40°C	40°C		
			Intake air temperature: 80°C	80°C		
14	Throttle position sensor (sub)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and the connect terminal numbers No. 1, No. 2, No. 3 and No. 4 with the use of the special tool: MB991658. • Ignition switch: ON	Fully close the throttle valve with your finger	4,300 – 4,700 mV	Code No. P0222, P0223	P.13A-109, P.13A-113
			Fully open the throttle valve with your finger	200 – 650 mV <M/T> 400 – 800 mV <CVT>		
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 23	P.13A-281
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 23	P.13A-281
			Engine: Cranking	ON		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
21	Engine coolant temperature sensor	Ignition switch: ON or engine running	Coolant temperature: –20°C	–20°C	Code No. P0115	P.13A-42
			Coolant temperature: 0°C	0°C		
			Coolant temperature: 20°C	20°C		
			Coolant temperature: 40°C	40°C		
			Coolant temperature: 80°C	80°C		
22	Crank angle sensor	• Engine: Cranking • Tachometer: Connected	Compare engine speed on tachometer with the value displayed on M.U.T.-III	Matched	–	–
		• Engine: Idle operation (At approximately 1 minute later from when the engine starting sequence is completed, the engine is in the steady state.) • Transmission: neutral <M/T> or "P" range <CVT> • A/C switch: OFF	Coolant temperature: –20°C	1,350 – 1,550 r/min		
			Coolant temperature: 0°C	1,190 – 1,390 r/min <M/T> 1,200 – 1,400 r/min <CVT>		
			Coolant temperature: 20°C	950 – 1,150 r/min		
			Coolant temperature: 40°C	850 – 1,050 r/min		
			Coolant temperature: 80°C	650 – 850 r/min <M/T> 600 – 800 r/min <CVT>		
25	Barometric pressure sensor	Ignition switch: ON	Altitude: 0m	101 kPa	Code No. P2226	P.13A-223
			Altitude: 600m	95 kPa		
			Altitude: 1,200m	88 kPa		
			Altitude: 1,800m	81 kPa		
29	Inhibitor switch <CVT>	Ignition switch: ON	Selector lever: P or N	P, N	Procedure No. 5	P.13A-245
			Selector lever: D, Ds, L, or R	D, Ds, L, R		

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<table>
<tr><th>Item No.</th><th>Inspection item</th><th colspan="3">Inspection condition</th><th>Normal condition</th><th>Inspection procedure No.</th><th>Reference page</th></tr>
<tr><td rowspan="6">32</td><td rowspan="6">Manifold absolute pressure sensor</td><td rowspan="6">• Engine coolant temperature: 80 – 95°C
• Lamps, electric cooling fan and all accessories: OFF
• Transmission: neutral <M/T> or "P" range <CVT>
• Ignition switch: ON</td><td rowspan="4">Engin e stop</td><td>Altitude: 0 m</td><td>101 kPa</td><td rowspan="6">Code No. P0105</td><td rowspan="6">P.13A-23</td></tr>
<tr><td>Altitude: 600 m</td><td>95 kPa</td></tr>
<tr><td>Altitude: 1,200 m</td><td>88 kPa</td></tr>
<tr><td>Altitude: 1,800 m</td><td>81 kPa</td></tr>
<tr><td colspan="2">Idle operation</td><td>22.0 – 36.0 kPa</td></tr>
<tr><td colspan="2">Excessive acceleration</td><td>Depending on vacuum pressure of inlet manifold</td></tr>
<tr><td rowspan="3">41</td><td rowspan="3">Injectors*1</td><td rowspan="3">• Engine coolant temperature: 80 – 95°C
• Lamps, electric cooling fan and all accessories: OFF
• Transmission: neutral <M/T> or "P" range <CVT></td><td colspan="2">Idle operation</td><td>1.4 – 2.8 ms <M/T>
1.6 – 2.8 ms <CVT></td><td rowspan="3">–</td><td rowspan="3">–</td></tr>
<tr><td colspan="2">2,500 r/min</td><td>0.9 – 2.9 ms <M/T>
1.5 – 2.7 ms <CVT></td></tr>
<tr><td colspan="2">Excessive acceleration</td><td>Increased</td></tr>
<tr><td rowspan="2">44</td><td rowspan="2">Ignition advance</td><td rowspan="2">• Engine: After warm-up
• Install timing light (for use to measure actual ignition timing)</td><td colspan="2">Idle operation</td><td>2 – 18°CA (°BTDC)</td><td rowspan="2">–</td><td rowspan="2">–</td></tr>
<tr><td colspan="2">2,500 r/min</td><td>34 – 54°CA (°BTDC) <M/T>
35 – 55°CA (°BTDC) <CVT></td></tr>
<tr><td rowspan="2">49</td><td rowspan="2">A/C relay</td><td rowspan="2">Engine: After warm-up, idle operation</td><td colspan="2">A/C switch: OFF</td><td>OFF (compressor is not driven)</td><td rowspan="2">Procedure No. 26</td><td rowspan="2">P.13A-310</td></tr>
<tr><td colspan="2">A/C switch: ON</td><td>ON (compressor is driven)</td></tr>
<tr><td>59</td><td>Oxygen sensor (rear)</td><td>Engine: After warm-up</td><td colspan="2">At excessive acceleration</td><td>200 – 800 mV</td><td>Code No.P0136</td><td>P.13A-75</td></tr>
<tr><td rowspan="2">67</td><td rowspan="2">Stop lamp switch</td><td rowspan="2">Ignition switch: ON</td><td colspan="2">Brake pedal: Depressed</td><td>ON</td><td rowspan="2">Procedure No. 27</td><td rowspan="2">P.13A-316</td></tr>
<tr><td colspan="2">Brake pedal: Released</td><td>OFF</td></tr>
</table>

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
68	EGR valve <CVT>	• Engine coolant temperature: 80 – 95°C • Lights and all accessories: OFF • Transmission "P" range	Idling	5 STEP or less	Code No. P0403	P.13A-153
			2,500 r/min	5 STEP or less		
77	Accelerator pedal position sensor (sub)	Ignition switch: ON	Release the accelerator pedal	300 – 700 mV	Code No. P2127, P2128	P.13A-208, P.13A-212
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	2,000 – 2,500 mV <M/T> 2,000 mV or more <CVT>		
78	Accelerator pedal position sensor (main)	Ignition switch: ON	Release the accelerator pedal	800 – 1,200 mV	Code No. P2122, P2123	P.13A-201, P.13A-205
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4,000 – 4,800 mV <M/T> 4,000 mV or more <CVT>		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
79	Throttle position sensor (main)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 1, No. 2, No. 3 and No. 4 with the use of the special tool: MB991658. • Ignition switch: ON	Fully close the throttle valve with your finger	300 – 700 mV	Code No. P0122, P0123	P.13A-50, P.13A-54
			Fully open the throttle valve with your finger	4,000 – 4,800 mV <M/T> 4,000 mV or more <CVT>		
		Engine: After warm-up, idle operation after warm-up	No load	400 – 800 mV <M/T> 500 – 700 mV <CVT>		
			A/C switch: OFF → ON	Voltage rises		
			Transmission: N → D range			
7E	Variable valve timing phase angle	Idling without load		0 – 5° CA	–	–
		Running with high load		To advance		
9E	Variable speed	Drive 40 km/h		Approximately 40 km/h	–	–
13 *2	Intake air temperature sensor	Ignition switch: ON or engine running	Intake air temperature: –20°C	–20°C	Code No. P0110	P.13A-34
			Intake air temperature: 0°C	0°C		
			Intake air temperature: 20°C	20°C		
			Intake air temperature: 40°C	40°C		
			Intake air temperature: 80°C	80°C		

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<table>
<tr><th>Item No.</th><th>Inspection item</th><th colspan="3">Inspection condition</th><th>Normal condition</th><th>Inspection procedure No.</th><th>Reference page</th></tr>
<tr><td rowspan="5">21 *2</td><td rowspan="5">Engine coolant temperature sensor</td><td rowspan="5">Ignition switch: ON or engine running</td><td colspan="2">Coolant temperature: –20°C</td><td>–20°C</td><td rowspan="5">Code No. P0115</td><td rowspan="5">P.13A-42</td></tr>
<tr><td colspan="2">Coolant temperature: 0°C</td><td>0°C</td></tr>
<tr><td colspan="2">Coolant temperature: 20°C</td><td>20°C</td></tr>
<tr><td colspan="2">Coolant temperature: 40°C</td><td>40°C</td></tr>
<tr><td colspan="2">Coolant temperature: 80°C</td><td>80°C</td></tr>
<tr><td rowspan="6">22 *2</td><td rowspan="6">Crank angle sensor</td><td>• Engine: Cranking
• Tachometer: Connected</td><td colspan="2">Compare engine speed on tachometer with the value displayed on M.U.T.-III</td><td>Matched</td><td rowspan="6">–</td><td rowspan="6">–</td></tr>
<tr><td rowspan="5">• Engine: Idle operation (At approximately 1 minute later from when the engine starting sequence is completed, the engine is in the steady state.)
• Transmission: neutral <M/T> or "P" range <CVT>
• A/C switch: OFF</td><td colspan="2">Coolant temperature: –20°C</td><td>1,350 – 1,550 r/min</td></tr>
<tr><td colspan="2">Coolant temperature: 0°C</td><td>1,200 – 1,400 r/min</td></tr>
<tr><td colspan="2">Coolant temperature: 20°C</td><td>950 – 1,150 r/min</td></tr>
<tr><td colspan="2">Coolant temperature: 40°C</td><td>850 – 1,050 r/min</td></tr>
<tr><td colspan="2">Coolant temperature: 90°C</td><td>600 – 800 r/min</td></tr>
<tr><td>24 *2</td><td>Vehicle speed</td><td colspan="3">Drive 40 km/h</td><td>Approximately 40 km/h</td><td>–</td><td>–</td></tr>
<tr><td rowspan="6">32 *2</td><td rowspan="6">Manifold absolute pressure sensor</td><td rowspan="6">• Engine coolant temperature: 80 – 95°C
• Lamps, electric cooling fan and all accessories: OFF
• Transmission: neutral <M/T> or "P" range <CVT>
• Ignition switch: ON</td><td rowspan="4">Engine stop</td><td>Altitude: 0 m</td><td>101 kPa</td><td rowspan="6">Code No. P0105</td><td rowspan="6">P.13A-23</td></tr>
<tr><td>Altitude: 600 m</td><td>95 kPa</td></tr>
<tr><td>Altitude: 1,200 m</td><td>88 kPa</td></tr>
<tr><td>Altitude: 1,800 m</td><td>81 kPa</td></tr>
<tr><td colspan="2">Idle operation</td><td>22.0 – 36.0 kPa</td></tr>
<tr><td colspan="2">Excessive acceleration</td><td>Depending on vacuum pressure of inlet manifold</td></tr>
</table>

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
44 *2	Ignition advance	• Engine: After warm-up • Install timing light (for use to measure actual ignition timing)	Idle operation	2 – 18°CA (°BTDC)	–	–
			2,500 r/min	34 – 54°CA (°BTDC) <M/T> 35 – 55°CA (°BTDC) <CVT>		
81 *2	Long-term fuel compensation <CVT>	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		–13 to 13 %	Code No. P0170	P.13A-87
82 *2	Shot-term fuel compensation <CVT>	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		–20 to 20 %	Code No. P0170	P.13A-87
87 *2	Calculation load value <CVT>	Engine: After warm-up	Idle operation	15 – 40 %	–	–
			2,500 r/min	15 – 40 %		
88 *2	Fuel control condition <CVT>	Engine: After warm-up	2,500 r/min	Closed loop	–	–
			Acceleration	Open loop-drive condition		
8A *2	Throttle position sensor (main) *2	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 1, and No. 2, No. 3 and No. 4 with the use of the special tool: MB991658. • Ignition switch: ON	Fully close the throttle valve with your finger	0 – 12%	Code No. P0122, P0123	P.13A-50, P.13A-54
			Fully open the throttle valve with your finger	75 – 100%		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
A1 *2	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	0.2 V or less	Code No. P0130	P.13A-62
			At excessive acceleration	0.6 – 1.0 V		
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-CVT-ECU <CVT>	Idle operation	0.4 V or less ⇔ 0.6 – 1.0 V		
			2,500 r/min			
A2*2	Oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0.2 – 0.8 V (After several seconds have elapsed)	Code No. P0136	P.13A-75

⚠ CAUTION

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward

*NOTE: *1: On the new vehicle (mileage: 500 km or less), injector drive time may be longer by approximately 10%.*

*NOTE: *2: When service data in check mode is selected, the data is not displayed.*

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Engine-ECU <M/T> or Engine-CVT-ECU <CVT> Monitor Item

- Items useful for grasping the engine control condition by the engine-ECU <M/T> or engine-CVT-ECU <CVT> are provided in this monitor item section.
- Values of these monitor items vary greatly depending on marginal difference of measurement conditions, difference of the environment, aged deterioration of vehicles and so on, and it is difficult to show the precise specification values. Therefore, check conditions, display range and movement of values are described.

Item No.	Inspection item	Explanation of M.U.T. display	Guideline for inspection	Display range, numerical value
5A	Air-fuel ratio learning value of B zone (Low speed load)	• Shows compensation value that corrects air-fuel ratio feedback control under mid-to-high load • Minus side shows that injection amount decreases and plus side shows that it increases	Engine: After warm-up, drive at 40 km/h	–25 to 25%
5B	Idle speed control position learned value	• Shows compensation value that corrects idle speed control opening (throttle valve opening) • Minus side shows closed side and plus side shows open side	Ignition switch: ON	–128 to 127STEP
5C	Idle speed control position learned value (A/C load)	• Shows compensation value that corrects idle speed control opening (throttle valve opening) when A/C is ON • Minus side shows closed side and plus side shows open side	Ignition switch: ON	–128 to 127STEP
6A	Knock retard	• Shows retard amount of ignition timing controlled by detonation sensor output	Engine: Sudden acceleration after warm-up	Retards in response to accelerator opening
6B	Learned knock retard	• Shows compensation value that corrects ignition timing from detonation sensor output • 0% side shows retard and 100% side shows advance	Ignition switch: ON	0 – 100%
6C	Target idle speed	• Shows target idle speed	Engine: Idle operation	Changes in response to engine coolant temperature
9B	Air-fuel ratio learning value of A zone (Low load)	• Shows compensation value that corrects air-fuel ratio feedback control under light load • Minus side shows that injection amount decreases and plus side shows that it increases	Engine: After warm-up, 2,500 r/min without any load	–25 to 25%

Item No.	Inspection item	Explanation of M.U.T. display	Guideline for inspection	Display range, numerical value
9D	Air-fuel ratio feedback integration	• Shows feedback amount of air-fuel ratio • Minus side shows that injection amount decreases and plus side shows that it increases	Engine: After warm-up, 2,500 r/min without any load	–25 to 25%
B2	Alternator G terminal duty	• Shows duty ratio to alternator G terminal	• Engine: After warm-up • Headlamp switch: When electrical load increases such as from OFF to ON	Increases
B3	Purge control solenoid valve duty	• Shows duty ratio to purge control solenoid valve	Engine: After warm-up	0 – 100%
81*	Long-term fuel compensati on	• Shows compensation value that corrects ait-fuel ratio feedback control under mid-to-high load • Minus side shows that injection amount decreases and plus side shows that it increases	Engine: After warm-up, 2,500 r/min without any load (Air-fuel ratio feedback control)	–25 to 25%
82*	Short-term fuel compensati on	• Shows feedback amount of air-fuel ratio • Minus side shows that injection amount decreases and plus side shows that it increases	Engine: After warm-up, 2,500 r/min without any load (Air-fuel ratio feedback control)	–25 to 25%
87*	Calculation load value	• Shows magnitude of engine load	Engine: After warm-up	0 – 100%
88*	Fuel control condition	• Shows air-fuel ratio feedback control status OL: Open loop, CL: Closed loop OL-DRV: OL depending on driving condition OL-SYS: OL due to system failure CL-HO2: CL only for front oxygen sensor (rear oxygen abnormal)	Engine: After warm-up	Changes depending on driving condition

*NOTE: *: This item is not displayed when the data list in check mode is selected.*

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Actuator Test Reference Table

M1131152501636

Item No.	Inspection item	Drive content	Inspection conditions	Normal condition	Code No. /Inspection procedure No.	Reference page
01	Injector	Cut off No. 1 injector	Engine: After warm-up, idle operation (Cut off injectors sequentially to check for a cylinder that does not change engine in idle status.	Engine is changed (becomes unstable or stalled)	Code No. P0201	P.13A-89
02		Cut off No. 2 injector			Code No. P0202	P.13A-94
03		Cut off No. 3 injector			Code No. P0203	P.13A-99
04		Cut off No. 4 injector			Code No. P0204	P.13A-104
07	Fuel pump	Drive fuel pump to circulate fuel	Ignition switch: ON / Check for pump operating noise near fuel tank	Operating noise audible	Procedure No. 24	P.13A-289
08	Purge control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: ON	When the valve is actuated, operating noise is audible	Procedure No. 29	P.13A-325
17	Basic ignition timing	Switch engine-ECU <M/T> or engine-CVT-ECU <CVT> to ignition timing adjusting mode	• Engine: Idle operation • Install timing light	5° BTDC	–	–
20	Cooling fan motor	Fan motor is driven	Ignition switch: ON	Fan motor rotates	Procedure No. 25	P.13A-302
34	Throttle valve control servo	Stop the throttle valve control servo	Ignition switch: ON	Throttle valve is opened slightly	Code No. P0638	P.13A-173

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CHECK AT THE ECU TERMINALS

M1131153500885

TERMINAL VOLTAGE CHECK CHART

1. Disconnect the engine-ECU connector or engine-CVT-ECU connector, and connect check harness special tool MB991987 between the engine-ECU connector or engine-CVT-ECU connectors.
2. Measure the voltage between each check harness connector terminal and check harness connector earth terminal (No. 75 or No. 76).
3. Connect a needle-nosed wire probe to a voltmeter probe.
4. Referring to the check sheet, insert the micromini probe into the check harness connector and measure the voltage.

NOTE:
1. *You may find it convenient to pull out the engine-ECU <M/T> or engine-CVT-ECU <CVT> to make it easier to reach the connector terminals.*
2. *The checks can be carried out off the order given in the chart.*

⚠ CAUTION

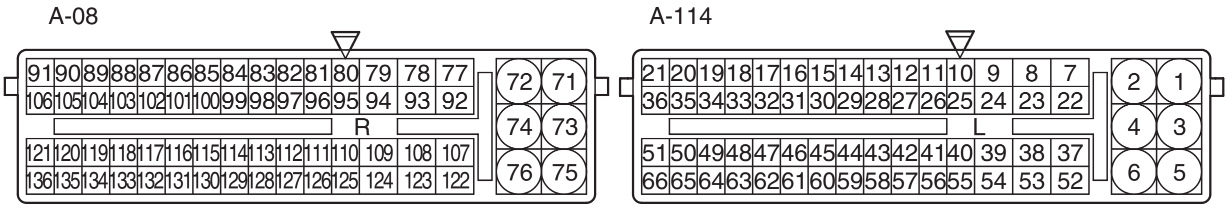
Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU <M/T> or engine-CVT-ECU <CVT> or all of them. Be careful to prevent this!

5. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
6. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

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Engine-ECU <M/T> or Engine-CVT-ECU <CVT> Connector Terminal Arrangement

Special Tool Check Harness (MB991987) Connector Terminal Arrangement



AK402726AB

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
5	EGR valve (A) <CVT>	Ignition switch: Immediately after turning ON	5 – 8 V* (fluctuates for approximately 3 seconds)
6	EGR valve (B) <CVT>		
53	EGR valve (C) <CVT>		
54	EGR valve (D) <CVT>		
7	Throttle valve control servo (+)	• Ignition switch: ON • Accelerator pedal: fully opened → fully closed	Decreases slightly (approximately 2 V) from battery voltage.
8	No. 1 injector	While engine is idling after having warmed up, suddenly depress the accelerator pedal.	From 9 – 13 V*, momentarily drops slightly
9	No. 2 injector		
23	No. 3 injector		
24	No. 4 injector		
10	Ignition coil – No. 1	Engine r/min: 3,000 r/min	0.1 – 2.0 V*
25	Ignition coil – No. 2		
40	Ignition coil – No. 3		
55	Ignition coil – No. 4		
12	Camshaft position sensor	Engine: Cranking	2.0 – 4.8 V*
		Engine: Idling	3.0 – 4.0 V*
13	Crank angle sensor	Engine: Cranking	0.4 – 4.0 V*
		Engine: Idling	2.0 – 3.0 V*

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Terminal No.	Check item	Check condition (Engine condition)		Normal condition
14	Engine coolant temperature sensor	Ignition switch: ON	When engine coolant temperature is –20°C	3.9 – 4.5 V
			When engine coolant temperature is 0°C	3.2 – 3.8 V
			When engine coolant temperature is 20°C	2.3 – 2.9 V
			When engine coolant temperature is 40°C	1.3 – 1.9 V
			When engine coolant temperature is 60°C	0.7 – 1.3 V
			When engine coolant temperature is 80°C	0.3 – 0.9 V
15	Throttle position sensor (main)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 1, No. 2, No. 3 and No. 4 with the use of the special tool (MB991658). • Ignition switch: "ON"	Fully close the throttle valve with your finger	0.3 – 0.7 V
			Fully open the throttle valve with your finger	4 V or more
16	Throttle position sensor (sub)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 1, No. 2, No. 3 and No. 4 with the use of the special tool (MB991658). • Ignition switch: ON	Fully close the throttle valve with your finger	4.3 – 4.7 V
			Fully open the throttle valve with your finger	0.2 – 0.6 V
17	Manifold absolute pressure sensor	Ignition switch: ON	Altitude: 0 m	3.8 – 4.2 V
			Altitude: 600 m	3.5 – 3.9 V
			Altitude: 1,200 m	3.3 – 3.7 V
			Altitude: 1,800 m	3.0 – 3.4 V
		Engine: Idling after warmed up		0.9 – 1.9 V
		Engine: While engine is idling, suddenly depress the accelerator pedal		From 0.9 – 1.9 V, momentarily drops

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
22	Throttle valve control servo (–)	• Ignition switch: ON • Accelerator pedal: fully closed → fully opened		Decreases slightly (approximately 2 V) from battery voltage.
31	Power supply voltage applied to throttle position sensor	Ignition switch: ON		4.9 – 5.1 V
34	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up		0.4 V or less ⇔ 0.6 – 1.0 V (Changes repeatedly)
38	Purge control solenoid valve	Ignition switch: ON		System voltage
		Engine: Warming up, racing		Voltage decreases
39	Ignition switch – ST	Engine: Cranking		8 V or more
51	Oxygen sensor (front) heater	Engine: Idling after warming up		1 V or less
		Engine: 5,000 r/min or more		System voltage
52	Oil feeder control valve	Ignition switch: ON		System voltage
		Running with high load		4.0 – 10 V*
56	Intake air temperature sensor	Ignition switch: ON	When intake air temperature is –20°C	3.8 – 4.4 V
			When intake air temperature is 0°C	3.2 – 3.8 V
			When intake air temperature is 20°C	2.3 – 2.9 V
			When intake air temperature is 40°C	1.5 – 2.1 V
			When intake air temperature is 60°C	0.8 – 1.4 V
			When intake air temperature is 80°C	0.4 – 1.0 V
64	Alternator G terminal	• Engine: Warm, idle (radiator fan: OFF) • Headlamp: OFF → ON • Stop lamp: OFF → ON • Rear defogger switch: OFF → ON		Voltage increases
65	Alternator FR terminal	• Engine: Warm, idle (radiator fan: OFF) • Headlamp: OFF → ON • Stop lamp: OFF → ON • Rear defogger switch: OFF → ON		Voltage decreases
77	Power supply	Ignition switch: ON		System voltage
92				
78	Power supply voltage applied to throttle valve control servo	Ignition switch: ON		System voltage
79	Oxygen sensor heater (rear)	Engine: Idling		1 V or less
		Engine: 5,000 r/min		System voltage

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Terminal No.	Check item	Check condition (Engine condition)		Normal condition
81	A/C relay	• Engine: Idle speed • A/C switch: OFF → ON (A/C compressor is operating)		System voltage → 1 V or less
82	Backup power supply	Ignition switch: "LOCK" (OFF)		System voltage
83	Accelerator pedal position sensor (main)	Ignition switch: ON	Release the accelerator pedal	0.8 – 1.2 V
			Depress the accelerator pedal fully	4.0 V or more
85	Power supply voltage applied to accelerator pedal position sensor (main)	Ignition switch: ON		4.9 – 5.1 V
86	Power supply voltage applied to accelerator pedal position sensor (sub)	Ignition switch: ON		4.9 – 5.1 V
88	Accelerator pedal position sensor (sub)	Ignition switch: ON	Release the accelerator pedal	0.3 – 0.7 V
			Depress the accelerator pedal fully	2 V or more
95	Fan control relay	Fan inactive state		System voltage
		Fan low-speed rotation state		1 V or less
97	Oxygen sensor (rear)	Engine: Running at 2,500 r/min after warmed up		0.2 – 0.8 V (After several seconds have elapsed)
107	Engine control relay	Ignition switch: "LOCK" (OFF)		System voltage
		Ignition switch: ON		1 V or less
110	Fuel pump relay	Ignition switch: ON		System voltage
		Engine: Idle speed		1 V or less
122	Ignition switch – IG	Ignition switch: ON		System voltage
123	Throttle valve control servo relay	Ignition switch: "LOCK" (OFF)		0 – 0.1 V
		Ignition switch: ON		1 V or less
128	Stop lamp switch	Release the brake pedal		1 V or less
		Depress the brake pedal		System voltage

*NOTE: *:The average voltage is shown when an analog voltmeter is used (because the average voltage might not be shown stably when digital voltmeter is used).*

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CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-ECU connector or engine-CVT-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU <M/T> or engine-CVT-ECU <CVT> harness-side connector while referring to the check chart.

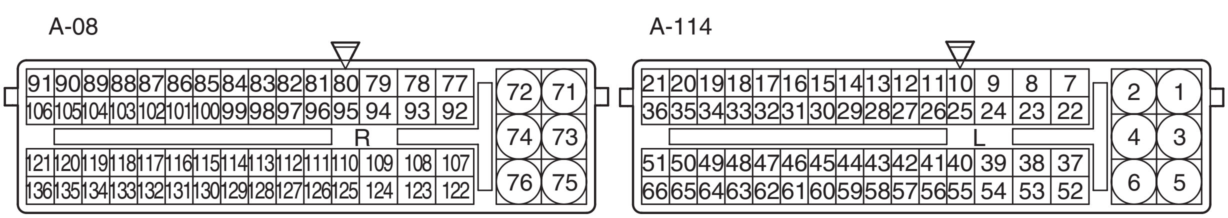
   NOTE:
   1. *When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.*
   2. *Checking need not be carried out in the order given in the chart.*

⚠ CAUTION

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU <M/T> or engine-CVT-ECU <CVT> and/or ohmmeter. Be careful to prevent this!

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and the repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU <M/T> or Engine-CVT-ECU <CVT> Harness Side Connector Terminal Arrangement



Terminal No.	Inspection item	Normal condition (Check condition)
5 – 92	EGR valve (A) <CVT>	20 – 24 Ω (at 20°C)
6 – 92	EGR valve (B) <CVT>	
53 – 92	EGR valve (C) <CVT>	
54 – 92	EGR valve (D) <CVT>	
7 – 22	Throttle valve control servo	0.3 – 100 Ω (at 20°C)
8 – 92	No. 1 injector	14 – 15 Ω (at 20°C)
9 – 92	No. 2 injector	
23 – 92	No. 3 injector	
24 – 92	No. 4 injector	
14 – 29	Engine coolant temperature sensor	14 – 17 kΩ (When coolant temperature is –20°C)
		5.1 – 6.5 kΩ (When coolant temperature is 0°C)
		2.1 – 2.7 kΩ (When coolant temperature is 20°C)
		0.9 – 1.3 kΩ (When coolant temperature is 40°C)
		0.48 – 0.68 kΩ (When coolant temperature is 60°C)
		0.26 – 0.36 kΩ (When coolant temperature is 80°C)

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Terminal No.	Inspection item	Normal condition (Check condition)
33 – 56	Intake air temperature sensor	13 – 17 kΩ (When intake air temperature is –20°C)
		5.3 – 6.7 kΩ (When intake air temperature is 0°C)
		2.3 – 3.0 kΩ (When intake air temperature is 20°C)
		1.0 – 1.5 kΩ (When intake air temperature is 40°C)
		0.56 – 0.76 kΩ (When intake air temperature is 60°C)
		0.30 – 0.42 kΩ (When intake air temperature is 80°C)
38 – 92	Purge control solenoid valve	30 – 34 Ω (at 20°C)
51 – 92	Oxygen sensor heater (front)	5 – 30 Ω (at 20°C)
52 – 92	Oil feeder control valve	6.9 – 7.9 Ω (at 20°C)
75 – Body earth	Engine-ECU <M/T> or engine-CVT-ECU <CVT> earth	Continuity (2 Ω or less)
76 – Body earth		
93 – Body earth		
108 – Body earth		
79 – 92	Oxygen sensor heater (rear)	5 – 30 Ω (at 20°C)

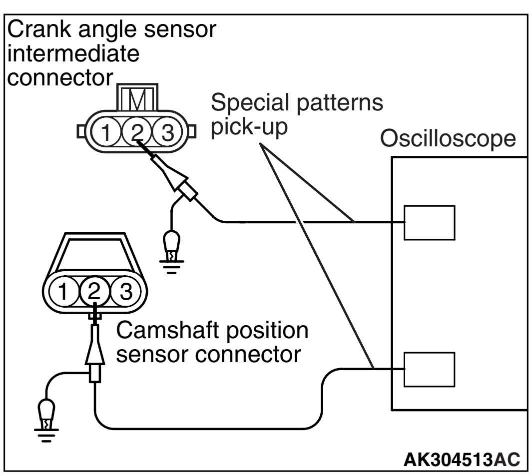
INSPECTION PROCEDURE USING OSCILLOSCOPE

M1131154501728

The output signals of the sensors and the conditions of the actuation signals of the actuators can be inspected visually by observing the waveforms on the oscilloscope.

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Measurement Method



1. Disconnect the camshaft position sensor connector and connect the special tool Test harness (MB991709) in between (All terminals should be connected).
2. Connect the oscilloscope special pattern pickup to camshaft position sensor terminal No. 2.
3. Disconnect the crank angle sensor intermediate connector and connect the special tool Test harness (MB991658) in between.
4. Connect the oscilloscope special patterns pickup to crank angle sensor terminal No. 2.

Alternate Method (Test harness not available)

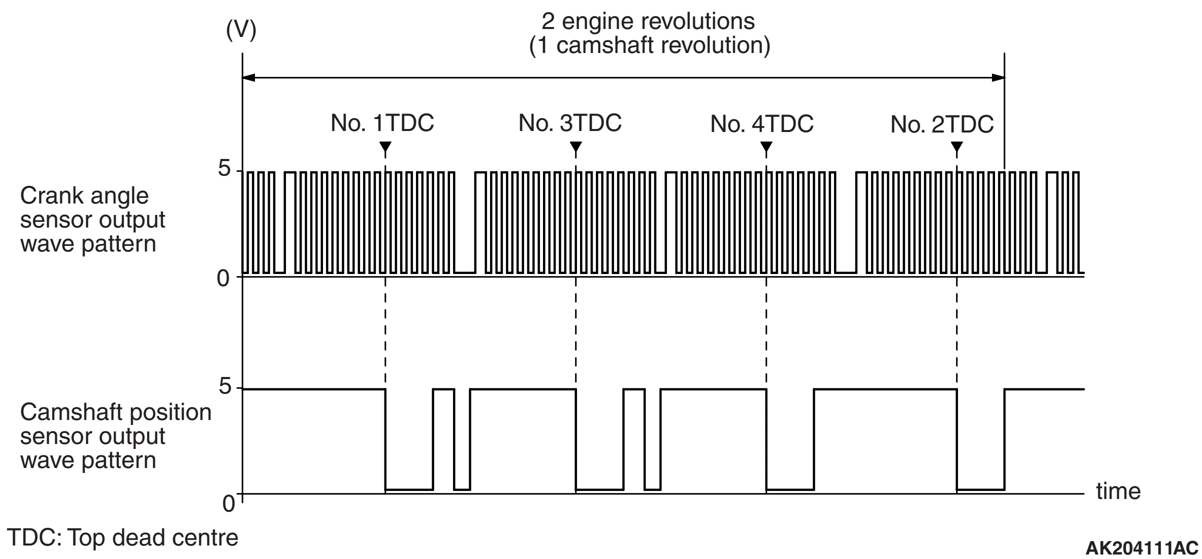
1. Disconnect the engine-ECU connector or engine-CVT-ECU connector and connect the special tool Power plant ECU check harness (MB991987) in between.
2. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 12 (When checking the camshaft position sensor signal wave pattern).
3. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 13 (When checking the crank angle sensor signal wave pattern).

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine speed	Idle

Standard wave pattern



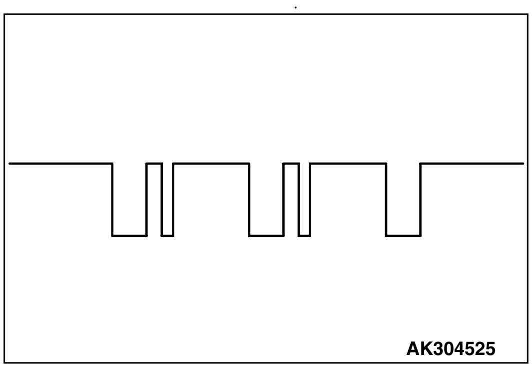
Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

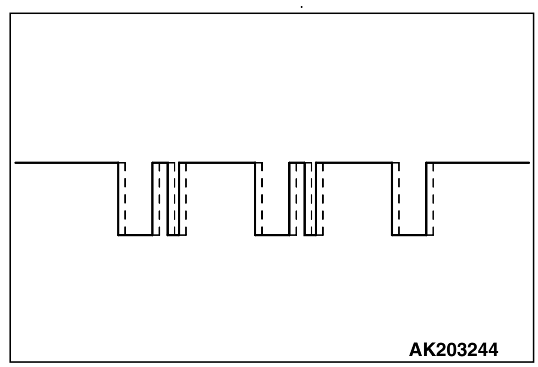
Examples of Abnormal Wave Patterns



Example 1

Cause of problem

Sensor interface malfunction



Example 2

Cause of problem

Loose timing belt

Abnormality in sensor disk

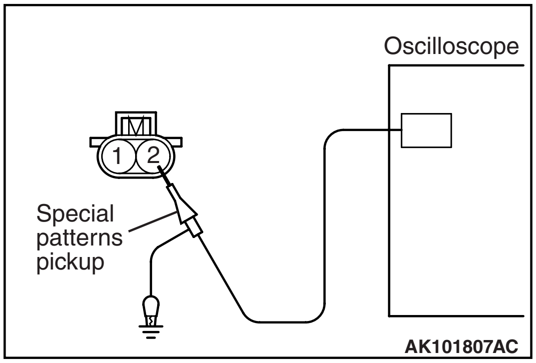
Wave pattern characteristics

Wave pattern is displaced to the left or right.

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INJECTOR

Measurement Method



1. Disconnect the injector connector, and then connect the special tool Test harness set (MB991658) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to terminal No. 2 of the injector connector.

Alternate Method (Test harness not available)

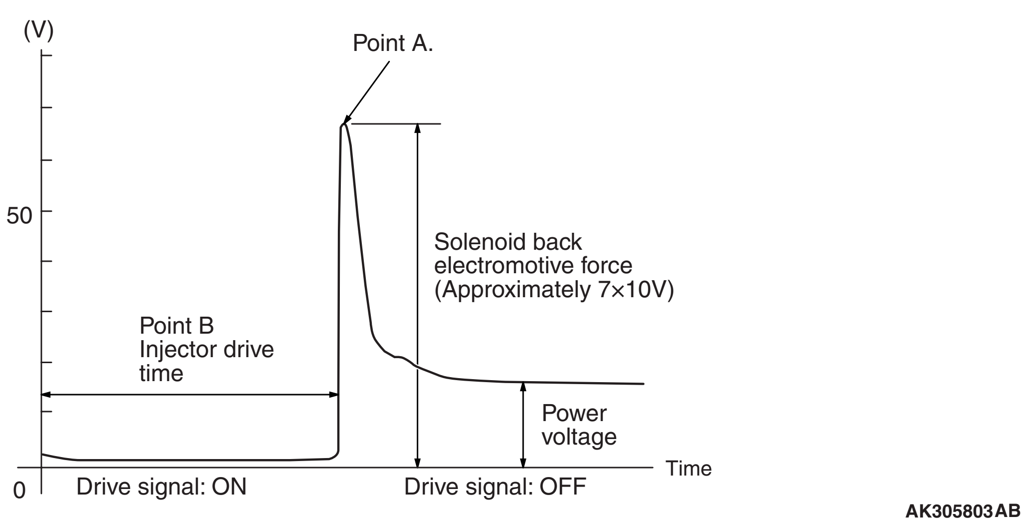
1. Disconnect the engine-ECU connector or engine-CVT-ECU connector and connect the special tool Power plant ECU check harness (MB991987) in between.
2. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 8 (When checking the No. 1 cylinder).
3. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 9 (When checking the No. 2 cylinder).
4. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 23 (When checking the No. 3 cylinder).
5. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 24 (When checking the No. 4 cylinder).

Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Display
Engine	Idle

Standard wave pattern



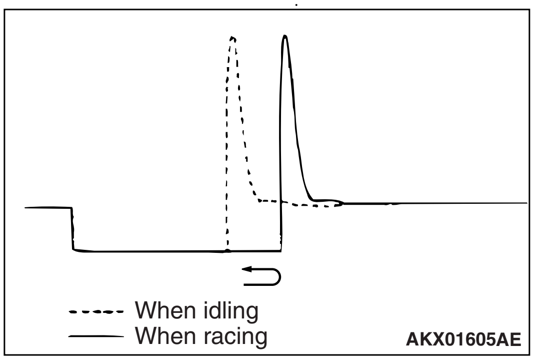
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Wave Pattern Observation Points

Point A: Height of solenoid back electromotive force

Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

Point B: Injector drive time

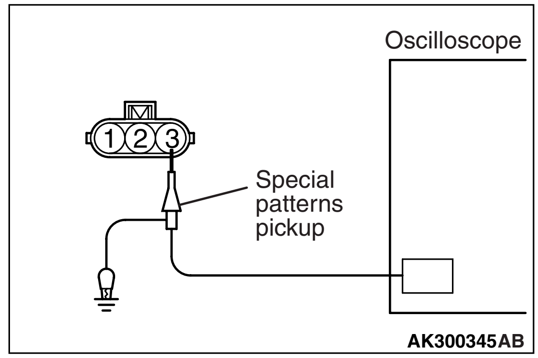


The injector drive time will be synchronized with the M.U.T.-III tester display.

- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.

IGNITION COIL AND POWER TRANSISTOR

Measurement Method



1. Disconnect the ignition coil connector, and connect the special tool Test harness (MB991658) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to terminal No. 3 of each ignition coil connector in turn.

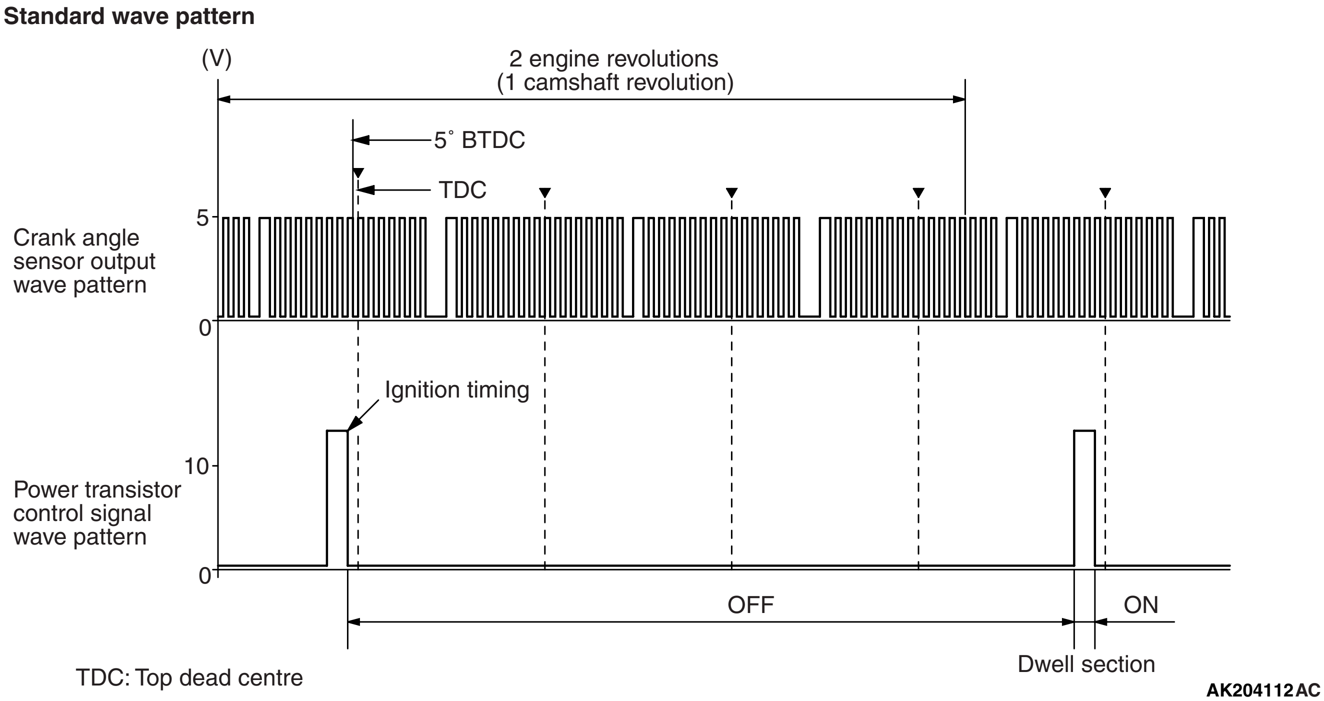
Alternate Method (Test harness not available)

1. Disconnect the engine-ECU connector or engine-CVT-ECU connector and connect the special tool Power plant ECU check harness (MB991987) in between.
2. Connect the oscilloscope probe to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 10. (When checking the No. 1 cylinder.)
3. Connect the oscilloscope probe to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 25. (When checking the No. 2 cylinder.)
4. Connect the oscilloscope probe to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 40. (When checking the No. 3 cylinder.)
5. Connect the oscilloscope probe to engine-ECU <M/T> or engine-CVT-ECU <CVT> terminal No. 55. (When checking the No. 4 cylinder.)

Standard Wave Pattern

Observation condition

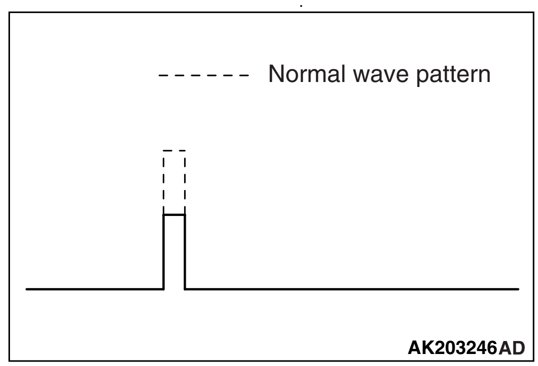
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine	Idle



Wave Pattern Observation Points

Point: When the engine speed increases, verify that the power transistor control signal (ignition timing) advances.

Examples of Abnormal Wave Patterns



Example
Wave pattern during engine cranking

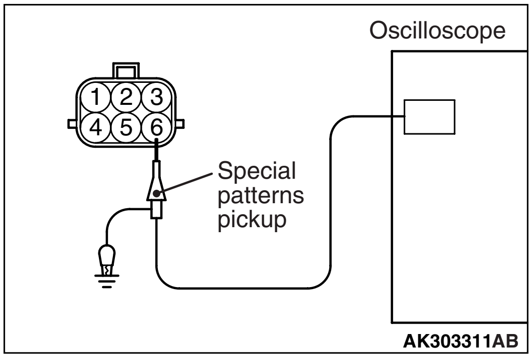
Cause of problem
Open-circuit in ignition primary circuit

Wave pattern characteristics
Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.

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EGR VALVE (STEPPER MOTOR) <CVT>

Measurement Method



1. Disconnect the EGR valve connector, and connect the special tool test harness (MB991658) in between.
2. Connect the oscilloscope probe to the EGR valve-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Alternate Method (Test Harness not Available)

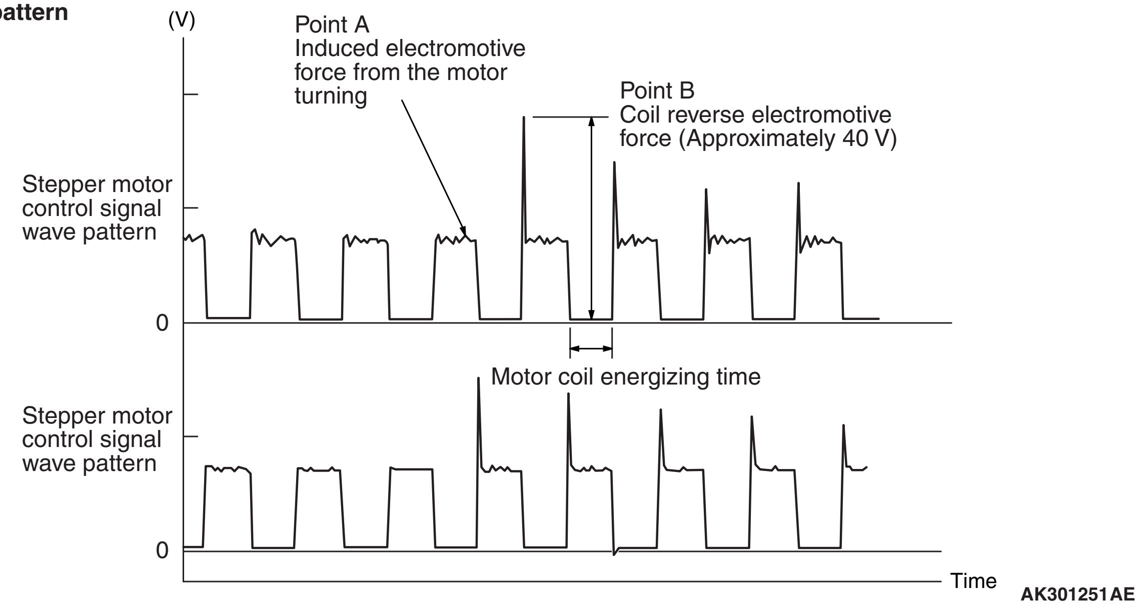
1. Disconnect the engine-CVT-ECU connector and connect the special tool Power plant ECU check harness (MB991987) in between.
2. Connect the oscilloscope probe to engine-CVT-ECU terminal No. 5, connection terminal No. 6, connection terminal No. 53, and connection terminal No. 54 respectively.

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine	Ignition switch: OFF → ON

Standard wave pattern



Wave pattern Observation Points

Check that the standard wave pattern appears when the EGR control servo is operating.

Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

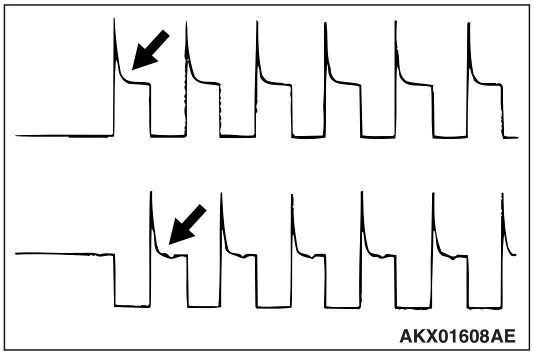
Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

Point B: Height of coil reverse electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil

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Examples of Abnormal Wave Patterns



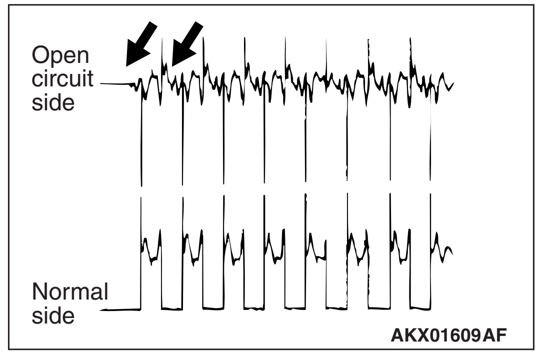
Example 1

Cause of problem

Sensor interface malfunction. (Motor is not operating)

Wave pattern characteristics

Induced electromotive force from the motor turning dose not appear.



Example 2

Cause of problem

Open circuit in the line between the EGR valve and the engine-CVT-ECU.

Wave pattern characteristics

Current is not supplied to the motor coil on the open circuit side. (Voltage dose not drop to 0 V.)

Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.

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ON-VEHICLE SERVICE

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001001078

⚠ CAUTION

When throttle body is cleaned, use the M.U.T.-III to initialize the learning value (Refer to GROUP 00, Precautions Before Service – Initialization Procedure for Learning Value in MPI Engine P.00-20).

1. Remove the air intake hose from the throttle body assembly.
2. Remove the throttle body assembly.

⚠ CAUTION

- **Do not spray the cleaning fluid directly to the throttle valve.**
- **Make sure the cleaning fluid does not enter the motor from the bypass line. Also make sure it does not enter the sensor through the shaft.**

3. Spray cleaning fluid on a clean cloth.
4. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning fluid.
5. Install the throttle body assembly.
6. Attach the air intake hose.

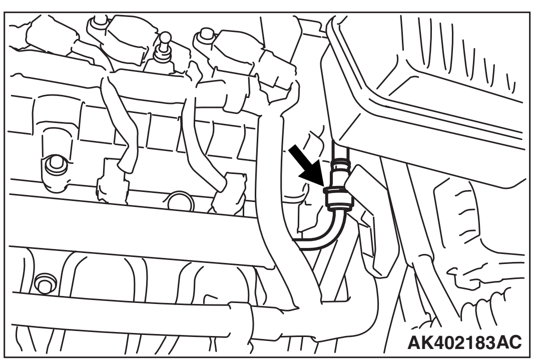
FUEL PRESSURE TEST

M1131001901509

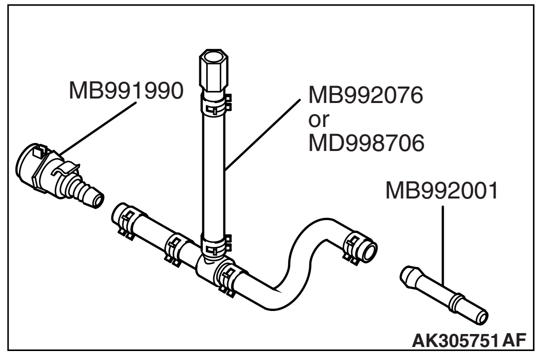
1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to P.13A-357).

⚠ CAUTION

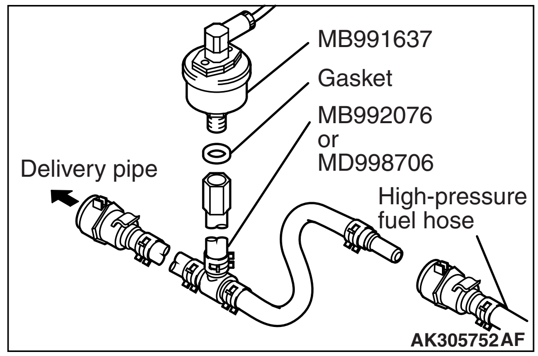
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.


AK402183AC

2. Disconnect the high-pressure fuel hose at the delivery pipe side.

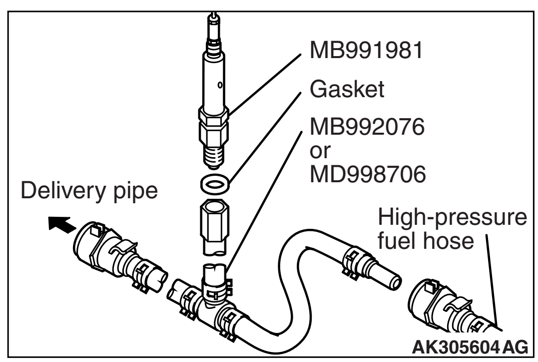


AK305751AF



AK305752AF

3. Assemble the special tool Injector test set (MB992076 or MD998706) of special tool as shown in figure.
   a. Remove either the instillation adopter for the injector or another adopter.
   b. Install the special tool quick connector (MB991990) and the special tool hose adapter (MB992001) to the hose without the adopter.
4. Assemble the fuel pressure measurement tools as follows.

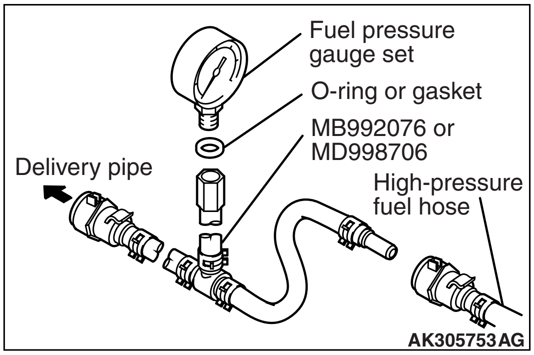


AK305604AG

<When using the fuel pressure gauge set (special tool) >

a. Via a gasket, install the special tool fuel pressure gauge set (MB991637 or MB991981) into the special tool that has already assembled as described.

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<When using the fuel pressure gauge>

a. Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described.

5. Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.

⚠ **CAUTION**

To prevent damage to the M.U.T.-III, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the M.U.T.-III.

6. Connect the M.U.T.-III to the diagnosis connector.
7. Turn the ignition switch to "ON" position (But do not start the engine).
8. Select "Item No. 05" from the M.U.T.-III Actuator test to drive the fuel pump. Check that there are no fuel leaks from any parts.
9. Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
10. Start the engine and run at idle.
11. Measure fuel pressure while the engine is running at idle.

    Standard value: Approximately 324 kPa at curb idle

12. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
13. If any of fuel pressure measured in steps 10 to 11 is out of specification, troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
• Fuel pressure too low • Fuel pressure drops after racing	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure regulator
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pressure regulator

14. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
Fuel pressure drops gradually after engine is stopped	Leaky injector	Replace injector
	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump

15. Release residual pressure from the fuel pipe line (Refer to P.13A-357).

⚠ **CAUTION**

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

16. Remove the fuel pressure gauge and special tool from the delivery pipe.

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17.Fit the fuel high pressure hose over the delivery pipe and tighten.

18.Check for any fuel leaks by following the procedure in step 7.

19.Disconnect the M.U.T.-III.

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE PRESSURIZED FUEL LINES)

M1131000900837

⚠ *WARNING*

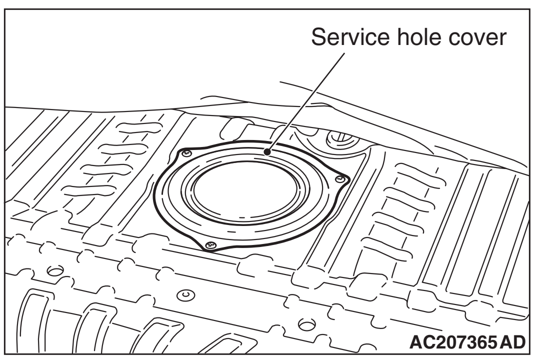
When removing the fuel pipe, etc., release fuel pressure to prevent fuel spray.

1. Lift up the rear seat assembly.

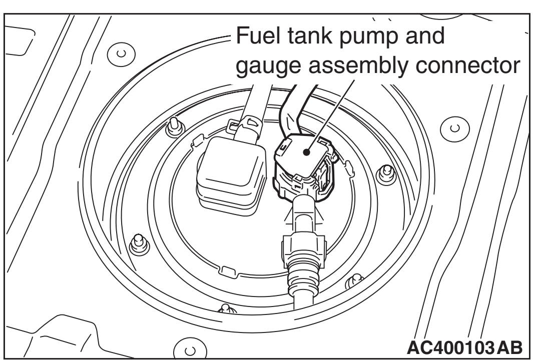
⚠ **CAUTION**

Moulding type of floor carpet is used. Be careful not to change the shape of carpet when turning it over for operation.

2. Remove the rear scuff plate, and turn over the floor carpet. (Refer to GROUP 52A, Interior Trims P.52A-11).



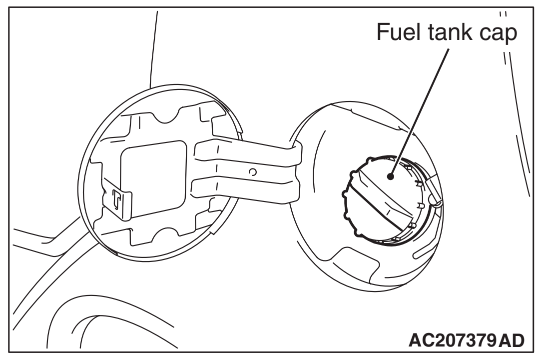
3. Remove the service hole cover.



4. Disconnect the fuel tank pump and gauge assembly connector.
5. Crank the engine for at least two seconds.
6. If the engine is not started, turn the ignition switch to the "LOCK" (OFF) position.
7. If the engine is started, turn the ignition switch to the "LOCK" (OFF) position after the engine stopped.
8. Connect the fuel tank pump and gauge assembly connector.
9. Install the service hole cover.
10. Return the floor carpet to the original state, and install the rear scuff plate. (Refer to GROUP 52A, Interior Trims P.52A-11).
11. Return the rear seat assembly to the original state.

FUEL TANK PUMP OPERATION CHECK

M1131002001491



1. Remove the fuel tank cap.

   NOTE: As the fuel tank pump is an in-tank type, the fuel tank pump sound is hard to hear. Then check the sound from the tank inlet.

2. Check the operating of the fuel tank pump by M.U.T.-III to force-drive the fuel tank pump.
3. Install the fuel tank cap.
4. If the fuel tank pump will not operate, check by using the following procedure. If normal, check the fuel tank pump drive circuit.

   (1) Turn the ignition switch to the "LOCK" (OFF) position.

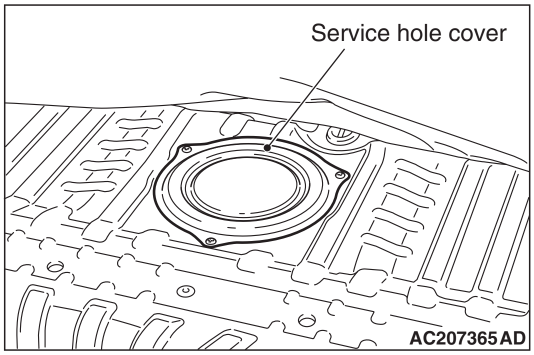
   (2) Lift up the rear seat assembly.

⚠ **CAUTION**

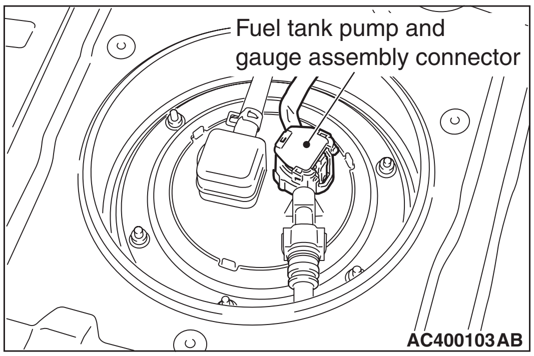
Moulding type of floor carpet is used. Be careful not to change the shape of carpet when turning it over for operation.

   (3) Remove the rear scuff plate, and turn over the floor carpet. (Refer to GROUP 52A, Interior Trims P.52A-11).

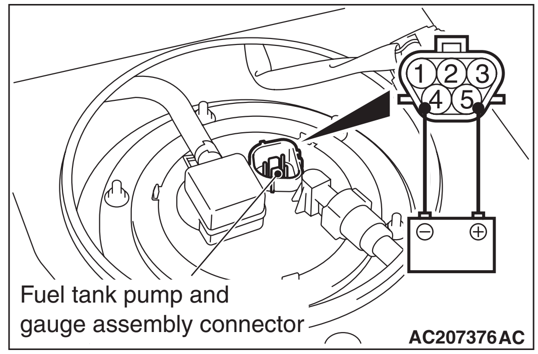
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(4) Remove the service hole cover.



(5) Disconnect the fuel tank pump and gauge assembly connector.
(6) Remove the fuel tank cap.



(7) When the fuel tank pump and gauge assembly connector terminal is connected directly to the battery, check if the sound of the fuel tank pump operation can be heard. If no operating sound is heard, replace the fuel tank pump (Refer to GROUP 13C, On-vehicle Service P.13C-3).

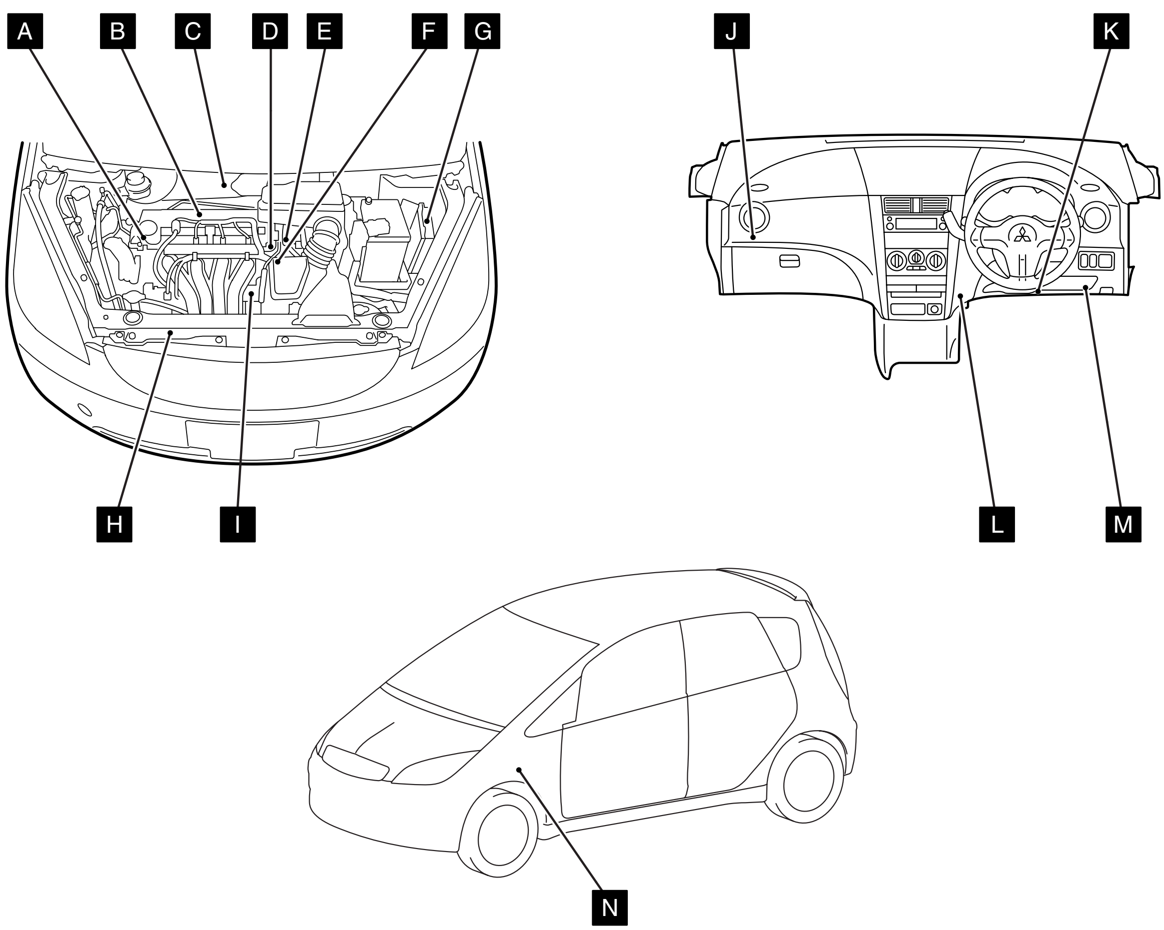
NOTE: As the fuel tank pump is an in-tank type, the fuel tank pump sound is hard to hear. Then check the sound from the tank inlet.

(8) Install the fuel tank cap.
(9) Check for fuel pressure by pinching the fuel hose with fingertips.
(10) Connect the fuel tank pump and gauge assembly connector.
(11) Install the service hole cover.
(12) Return the floor carpet to the original state, and install the rear scuff plate. (Refer to GROUP 52A, Interior Trims P.52A-11).
(13) Return the rear seat assembly to the original state.

COMPONENT LOCATION

M1131002101788

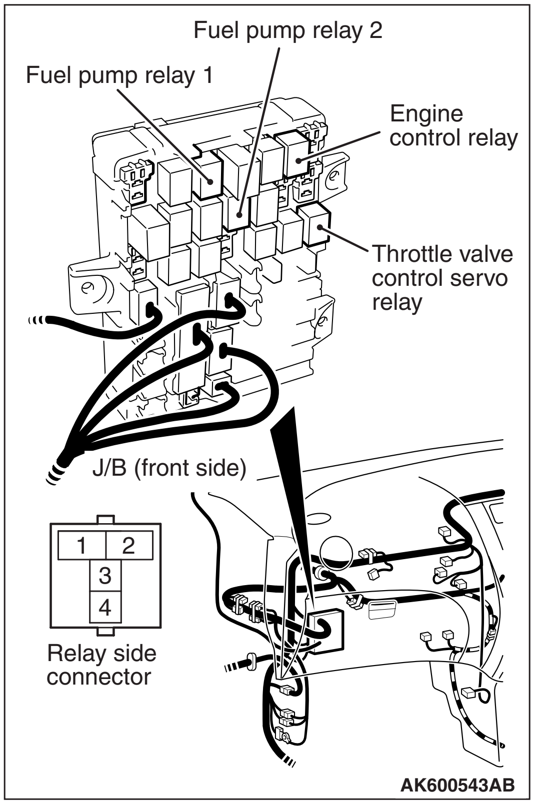
Name	Symbol	Name	Symbol
Accelerator pedal position sensor	M	Engine control relay	J
A/C relay	J	Engine coolant temperature sensor	D
Camshaft position sensor	F	Fuel pump relay	J
Crank angle sensor	H	Ignition coil	B
Detonation sensor	H	Injector	B
Diagnosis connector	G	Manifold absolute pressure sensor	I
EGR valve <CVT>	I	Oil feeder control valve	A
Electronic-controlled throttle valve (Throttle position sensor and throttle valve control servo)	I	Oxygen sensor (front)	C
Engine-ECU <M/T> or engine-CVT-ECU <CVT> (with barometric pressure sensor)	G	Oxygen sensor (rear)	N
		Purge control solenoid valve	E
		Stop lamp switch	K
		Throttle valve control servo relay	J



AK503633AB

ENGINE CONTROL RELAY CONTINUITY CHECK

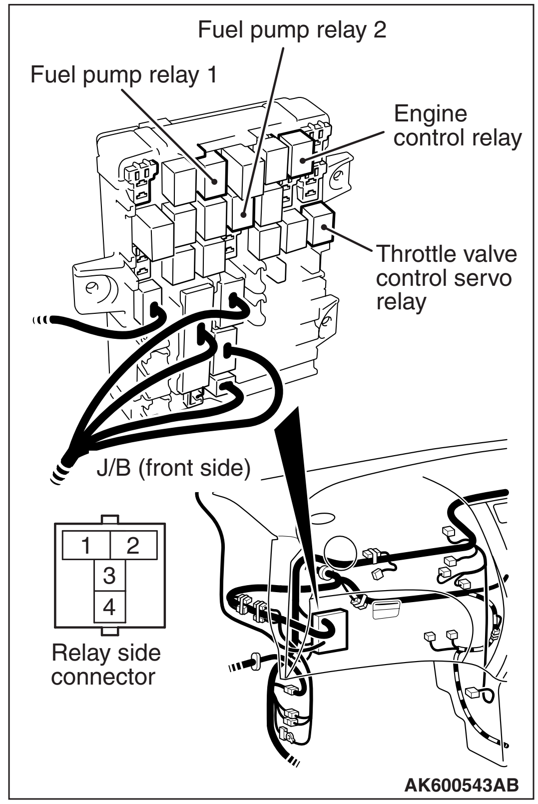
M1131050000903



Tester Connection Terminal	Battery Voltage	Normal State
1 – 2	No voltage	Continuity (2 Ω or less)
3 – 4	No voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 1 and negative (–) terminal of battery to terminal No. 2.)	Continuity (2 Ω or less)

FUEL PUMP RELAY CONTINUITY CHECK

M1131033000922

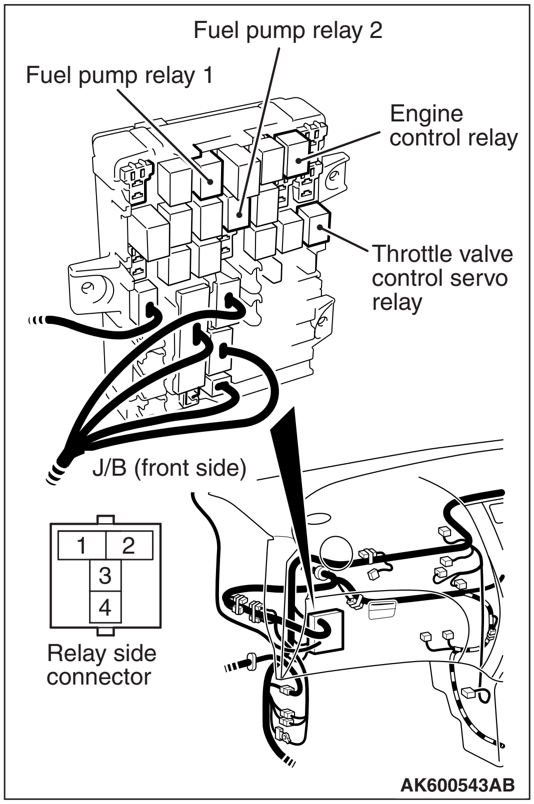


Tester Connection Terminal	Battery Voltage	Normal State
1 – 2	No voltage	Continuity (2 Ω or less)
3 – 4	No voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 1 and negative (–) terminal of battery to terminal No. 2.)	Continuity (2 Ω or less)

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THROTTLE VALVE CONTROL SERVO RELAY CONTINUITY CHECK

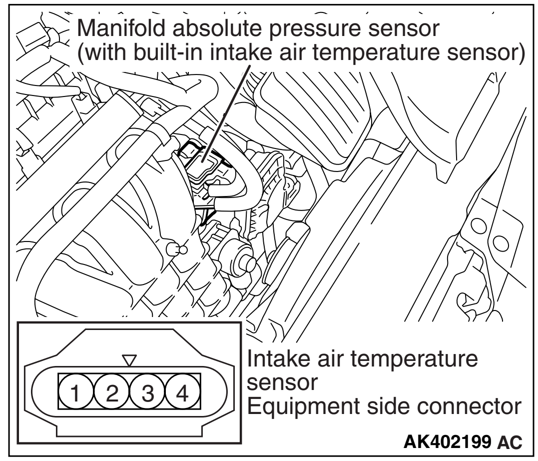
M1131053500264



Tester Connection Terminal	Battery Voltage	Normal State
1 – 2	No voltage	Continuity (2 Ω or less)
3 – 4	No voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 1 and negative (–) terminal of battery to terminal No. 2.)	Continuity (2 Ω or less)

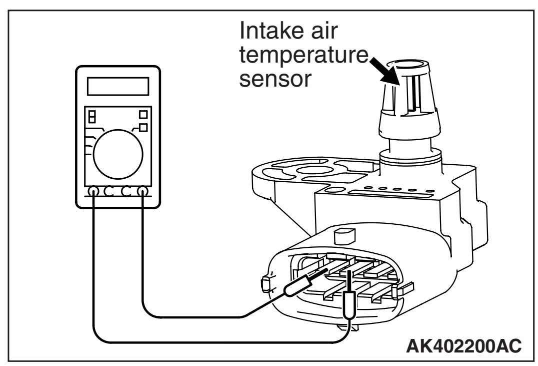
INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002800955



1. Disconnect the manifold absolute pressure sensor.
2. Measure resistance between terminals No. 3 and No. 4.

   Standard value:
   13 – 17 kΩ (at –20°C)
   5.3 – 6.7 kΩ (at 0°C)
   2.3 – 3.0 kΩ (at 20°C)
   1.0 – 1.5 kΩ (at 40°C)
   0.56 – 0.76 kΩ (at 60°C)
   0.30 – 0.42 kΩ (at 80°C)
3. Remove the manifold absolute pressure sensor.



4. Measure resistance while heating the sensor using a hair drier.

   Normal condition:

Temperature (°C)	Resistance (kΩ)
Higher	Smaller

5. If the value deviates from the standard value or the resistance remains unchanged, replace the manifold absolute pressure sensor assembly.
6. Install the manifold absolute pressure sensor and tighten it to the specified torque.

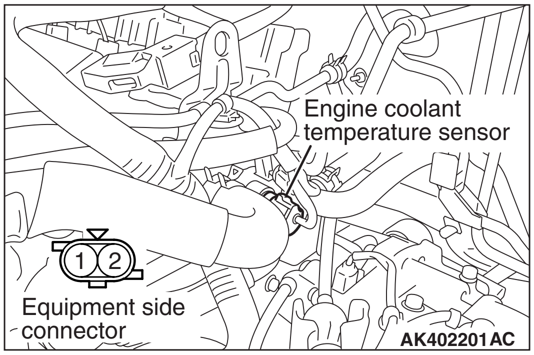
   Tightening torque: 6.0 ± 0.5 N·m

ENGINE COOLANT TEMPERATURE SENSOR CHECK

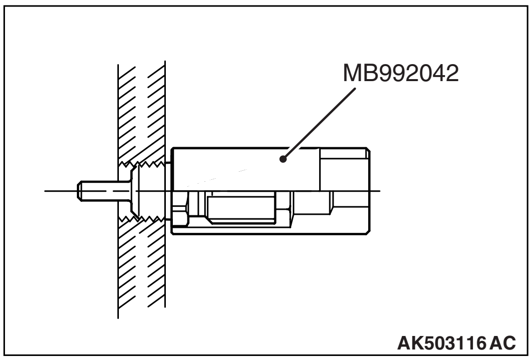
M1131003101156

⚠ CAUTION

Be careful not to touch the connector (resin section) with the tool when removing and installing.

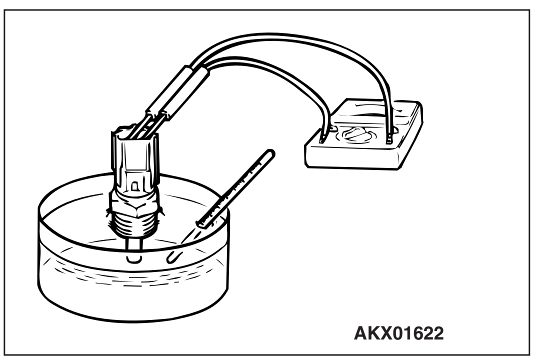


AK402201AC



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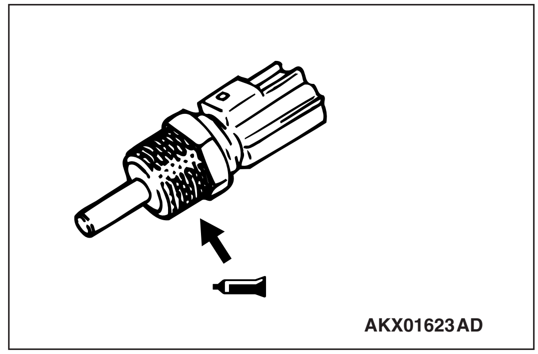
1. Remove the engine coolant temperature sensor using coolant temperature sensor wrench, special tool (MB992042).


AKX01622

2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

    Standard value:
    14 – 17 kΩ (at –20°C)
    5.1 – 6.5 kΩ (at 0°C)
    2.1 – 2.7 kΩ (at 20°C)
    0.9 – 1.3 kΩ (at 40°C)
    0.48 – 0.68 kΩ (at 60°C)
    0.26 – 0.36 kΩ (at 80°C)

3. If the resistance deviates from the standard value greatly, replace the sensor.


AKX01623AD

4. Apply sealant to threaded portion.

    Specified sealant:
    LOCTITE 262 or equivalent

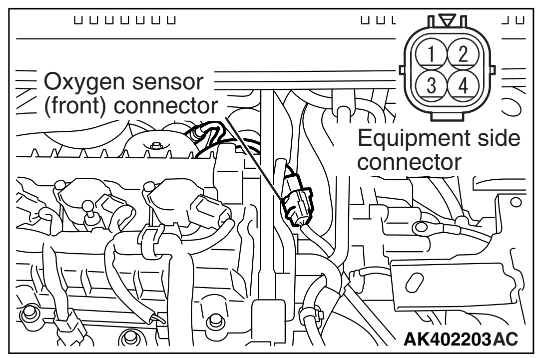
5. Tighten the engine coolant temperature sensor to the specified torque, using coolant temperature sensor wrench, special tool (MB992042)

    Tightening torque: 29 ± 10 N·m

OXYGEN SENSOR CHECK

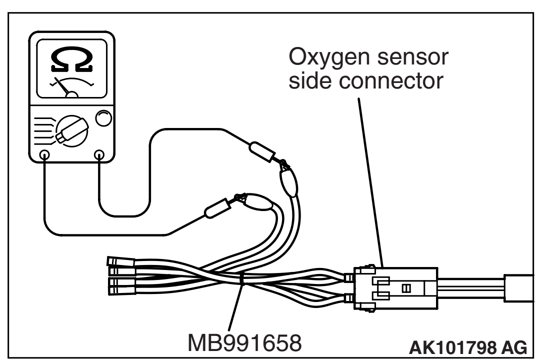
M1131005001627

OXYGEN SENSOR (FRONT)



AK402203AC

1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MB991658) to the connector on the oxygen sensor side.

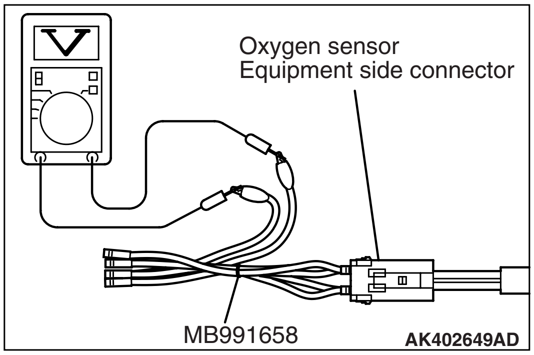


AK101798AG

2. Make sure that there is continuity (5 – 30 Ω at 20°C) between terminal No. 3 and No. 4 on the oxygen sensor connector.

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3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.



6. Connect a digital voltage meter between terminal No. 1 and No. 2.
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

⚠ CAUTION

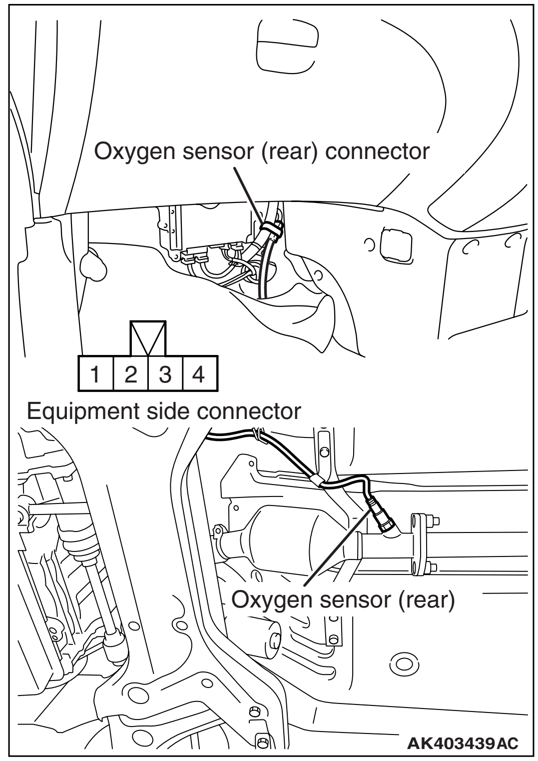
- **Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.**
- **Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.**

NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.3 and the terminal No. 4 of the oxygen sensor with a (+) terminal and (–) terminal of 12 V power supply respectively, then check again.

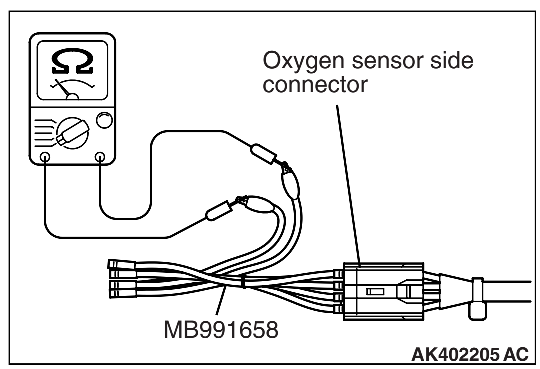
8. If the sensor is defective, replace the oxygen sensor.

NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler – Exhaust Pipe and Main Muffler Removal and installation P.15-19.

OXYGEN SENSOR (REAR)

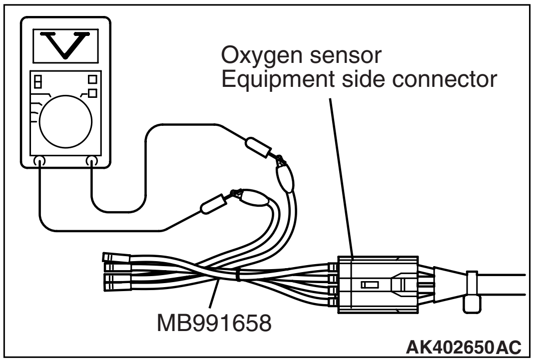


1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MB991658) to the connector on the oxygen sensor side.



2. Make sure that there is continuity (5 – 30 Ω at 20°C) between terminal No. 3 and No. 4 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.

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6. Connect a digital voltage meter between terminal No.1 and No. 2.
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

⚠ CAUTION

- **Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.**
- **Be careful the heater is broken when voltage of beyond 12 V is applied to the oxygen sensor heater.**

NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 3 and the terminal No. 4 of the oxygen sensor with a (+) terminal and (–) terminal of 12 V power supply respectively, then check again.

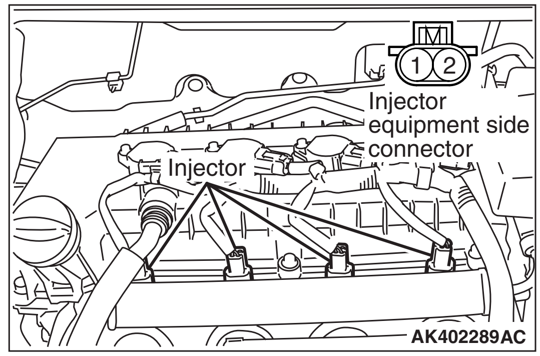
8. If the sensor is defective, replace the oxygen sensor.

NOTE: . For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler – Exhaust Pipe and Main Muffler Removal and installation P.15-19.

INJECTOR CHECK

M1131005201416

CHECK THE OPERATION SOUND



1. Use a stethoscope to listen to the operation sound (clicking) of the injectors while the engine is idling or cranking.

⚠ CAUTION

Beware that the operation sounds of other injectors can be heard even if the injector that is being inspected might not be operating.

2. Verify that the operation sound increases with the engine speed.

NOTE: If the operating sound cannot be heard, inspect the injector actuation circuit.

MEASUREMENT OF RESISTANCE BETWEEN TERMINALS

1. Disconnect the injector connector.
2. Measure the resistance between terminals.

Standard value: 14 – 15 Ω (at 20°C)

3. Connect the injector connector.

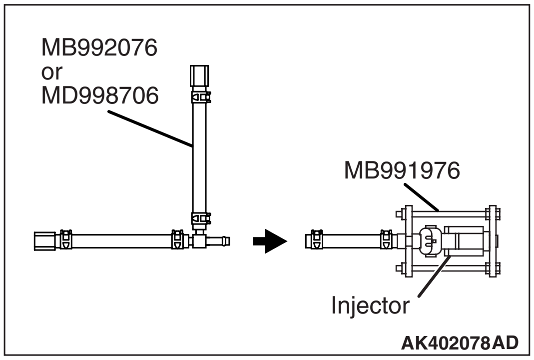
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CHECK THE INJECTION CONDITION

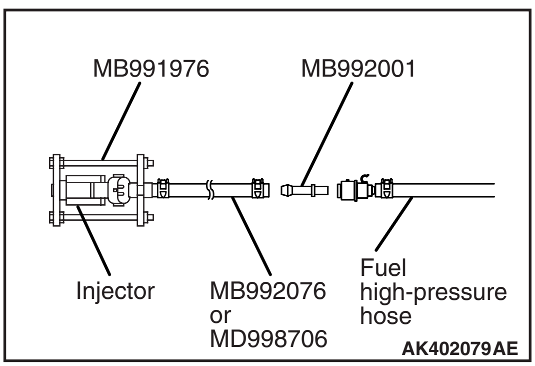
1. Carry out the procedure to prevent flow of the fuel (Refer to P.13A-357).

⚠ CAUTION
Do not make fuel splash by covering fuel with waste and so on because the residual pressure is in the fuel pipeline.

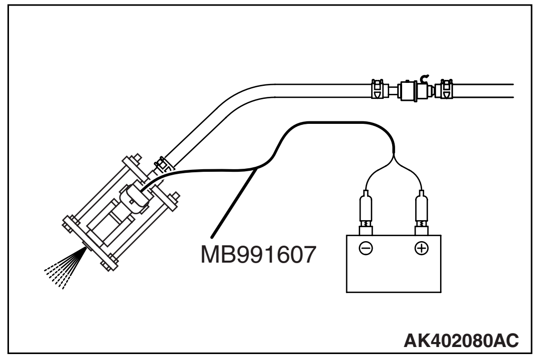
2. Remove the fuel high-pressure hose at the delivery pipe side.



3. Remove the injector.
4. Assemble Injector Test Set (MB992076 or MD998706) of the special tool as shown in Fig.
   a. Remove the installation hose for the injector.
   b. Install the injector to the installation hose for the injector and then fix it using Injector Holder (MB991976) of the special tool.



5. Install the special tool hose adapter (MB992001) to the installation hose for the injector and connect them to the fuel high-pressure hose.
6. Connect the M.U.T.-III to the diagnosis connector.
7. Turn the ignition switch to "ON" position (but do not start the engine).
8. Select "Item No. 07" from M.U.T.-III actuator test and drive the fuel pump.

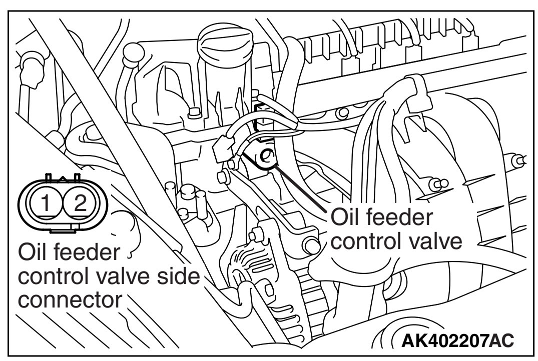


9. Connect Injector Test Harness (MB991607) of the special tool between the injector and battery, and then actuate the injector.
10. Check the fuel spray condition. The condition can be considered satisfactory unless it is extremely poor.
11. Stop actuating the injector. Check leakage from the injector nozzle. Turn the ignition switch to "LOCK OFF" position and then disconnect M.U.T.-III.
12. Actuate the injector until the fuel cannot flow. Draw the fuel out from the special tool.
13. Remove the special tool.
14. If the fuel spray condition is extremely poor or if there is the fuel leakage from the injector nozzle, replace the injector.
15. Install the injector and fuel high-pressure hose.

OIL FEEDER CONTROL VALVE CHECK

M1131053800050

OPERATION CHECK



1. Disconnect the oil feeder control valve connector.

⚠ CAUTION
To prevent the coil from burning, keep the duration of the voltage application as short as possible.

2. Apply battery voltage to the terminals of the connector at the oil feeder control valve, and make sure the oil feeder control valve makes a clicking sound.

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MEASUREMENT OF RESISTANCE BETWEEN TERMINALS

1. Disconnect the oil feeder control valve connector.
2. Measure the resistance between the terminals of the connector at the oil feeder control valve.

   Standard value: 6.9 – 7.9 Ω (at 20°C)

3. If resistance is outside the standard value, replace the oil feeder control valve.

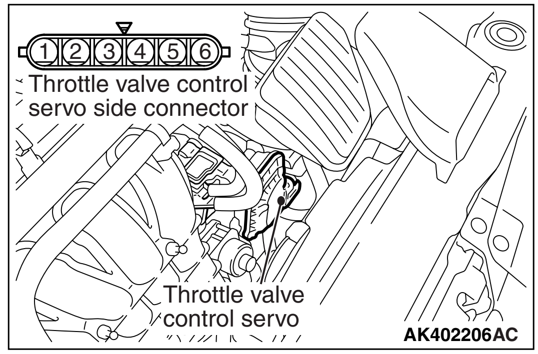
THROTTLE VALVE CONTROL SERVO CHECK

M1131051000326

OPERATION CHECK

1. Remove the air intake hose from the throttle body.
2. Turn the ignition switch to ON position.
3. Operate the accelerator pedal and confirm that the throttle valve is opening and closing accordingly.

CHECK THE COIL RESISTANCE



1. Disconnect the electronic-controlled throttle valve connector.
2. Measure the resistance between terminals No. 1 and No. 2 at the electronic-controlled throttle valve connector.

   Standard value: 0.3 – 100 Ω (at 20°C)

3. If the resistance is outside the standard value, replace the throttle body assembly.

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INJECTOR

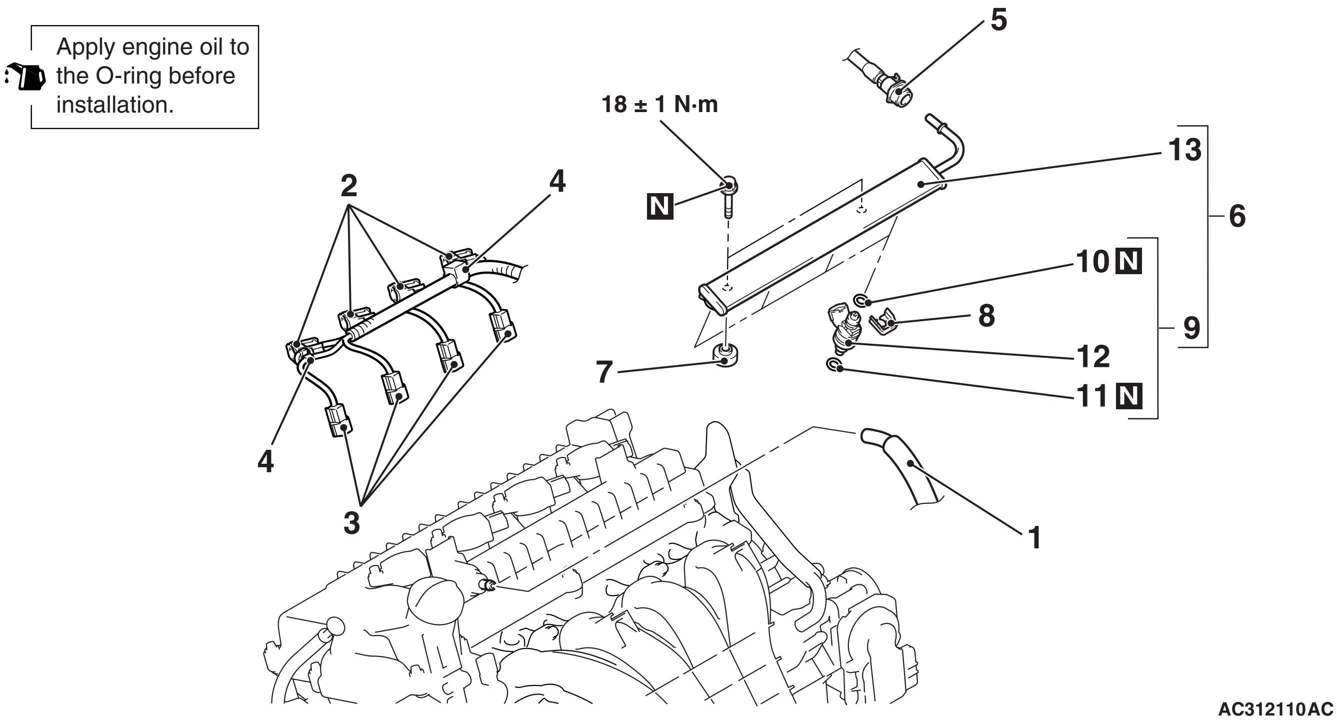
REMOVAL AND INSTALLATION

M1131007101620

⚠ CAUTION

When the fuel injector replacement is performed, use the M.U.T.-III to initialize the learning value (Refer to GROUP 00, Precautions Before Service – Initialization Procedure for Learning Value in MPI Engine P.00-20).

Pre-removal Operation	Post-installation Operation
• Fuel Discharge Prevention (Refer to P.13A-357). • Engine Cover Removal (Refer to GROUP 11A, Camshaft P.11A-17).	• Fuel Leakage Inspection • Engine Cover Installation (Refer to GROUP 11A, Camshaft P.11A-17).



Removal steps

		1.	PCV hose connection
		2.	Ignition coil connector
		3.	Fuel injector connector
		4.	Control harness clamp connection
<<A>>	>>E<<	5.	Fuel high-pressure hose connection
	>>D<<	6.	Fuel delivery pipe and fuel injector assembly
		7.	Fuel injector insulator

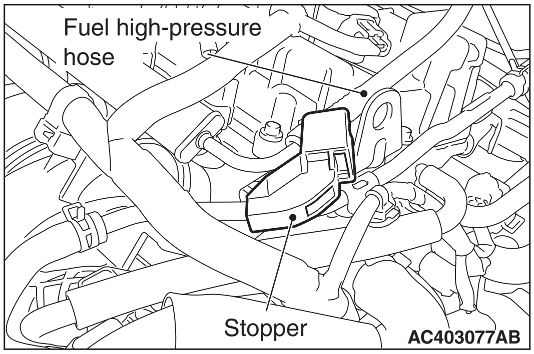
Removal steps (Continued)

>>C<<	8.	Fuel injector support
>>B<<	9.	Fuel injector assembly
>>A<<	10.	O-ring
>>A<<	11.	O-ring
	12.	Fuel injector
	13.	Fuel delivery pipe

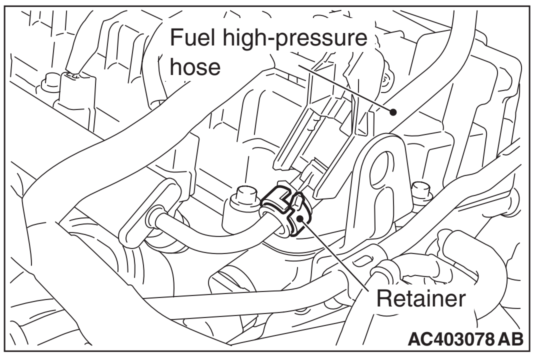
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REMOVAL SERVICE POINT

<<A>> FUEL HIGH-PRESSURE HOSE DISCONNECTION



1. Remove the stopper.

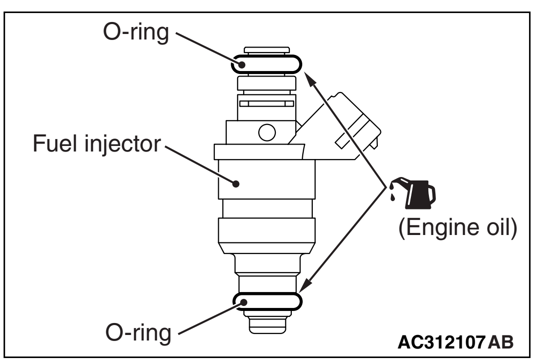


2. Raise the retainer, and pull out the fuel high-pressure hose.

   NOTE: If the retainer comes off, install it securely after pulling out the fuel high-pressure hose.

INSTALLATION SERVICE POINTS

>>A<< O-RING INSTALLATION



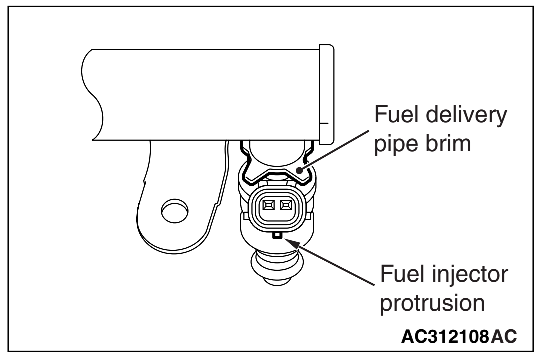
1. Apply a small amount of new engine oil to the O-ring.
2. While turning the fuel injector to the right and left, install the O-ring to the fuel injector with care not to damage the O-ring.

>>B<< FUEL INJECTOR ASSEMBLY INSTALLATION

⚠ CAUTION

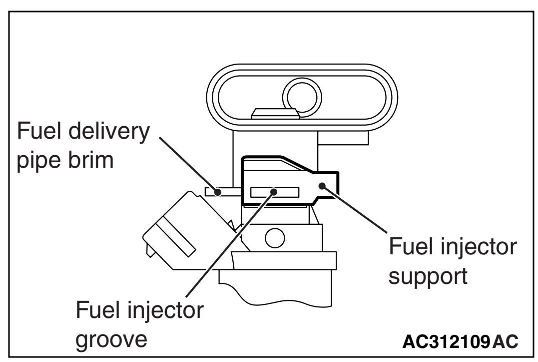
Do not let the engine oil get into the fuel delivery pipe will be damaged.

1. Apply a drop of new engine oil to the O-ring.
2. Turn the fuel injector assembly to the right and left to install to the fuel delivery pipe. Be careful not to damage the O-ring. After installing, check that the item turns smoothly.
3. If it does not turn smoothly, the O-ring may be trapped, remove the fuel injector assembly, re-install it into the fuel delivery pipe and check again.



4. Install the fuel injector assembly so that the convex portion of the fuel injector is located at the centre of the fuel delivery pipe brim.

>>C<< FUEL INJECTOR SUPPORT INSTALLATION



Install the fuel injector support to the fuel injector groove and fuel delivery pipe brim, and fix the fuel injector assembly and fuel delivery pipe.

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>>D<< FUEL DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY INSTALLATION

⚠ CAUTION

Do not let the engine oil get into the engine will be damaged.

1. Apply a small amount of new engine oil to the O-ring at the tip of the fuel injector assembly.

⚠ CAUTION

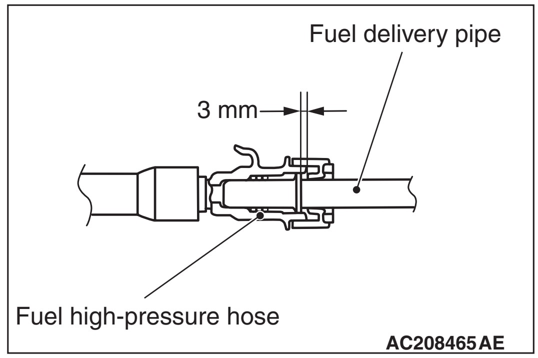
When installing the fuel delivery pipe and fuel injector assembly to the cylinder head, take care not to damage the O-ring at the tip of the fuel injector assembly.

2. Install the fuel delivery pipe and fuel injector assembly to the cylinder head. Be careful not to damage the O-ring.
3. Tighten the new fuel delivery pipe mounting bolts to the specified torque.

Tightening torque: 18 ± 1 N·m

>>E<< FUEL HIGH-PRESSURE HOSE CONNECTION

⚠ CAUTION



- **After connecting the fuel high-pressure hose, check that it has been securely installed by slightly pulling in the removal direction. At this time, also check that there is approximately 3-mm play.**
- **Do not let the engine oil get into the fuel delivery pipe will be damaged.**

Apply a small amount of new engine oil to the fuel delivery pipe, and install the fuel high-pressure hose to the fuel delivery pipe.

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THROTTLE BODY ASSEMBLY

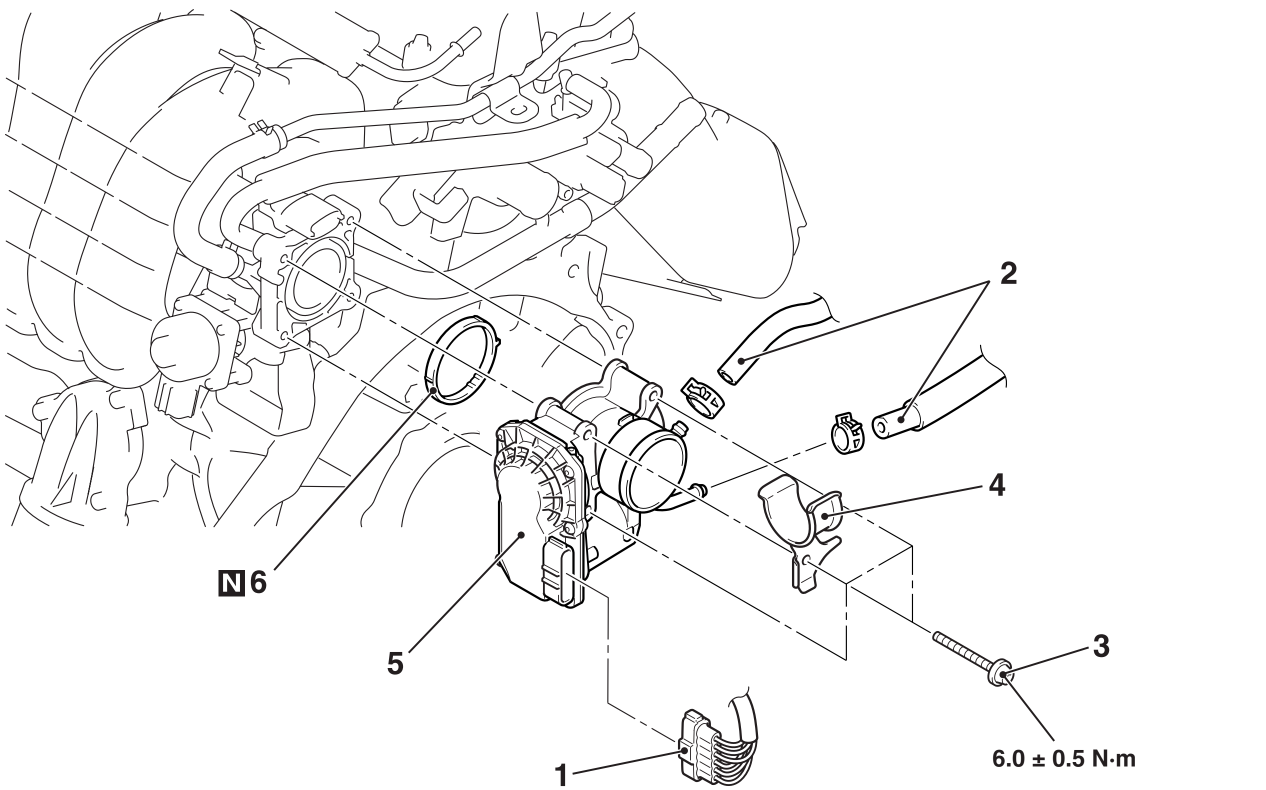
REMOVAL AND INSTALLATION

M1131007701495

⚠ CAUTION

- **When the throttle body assembly replacement is performed, use the M.U.T.-III to initialize the learning value (Refer to GROUP 00, Precautions Before Service − Initialization Procedure for Learning Value in MPI Engine P.00-20).**
- **Do not loosen the fixing screws for the resin cover of throttle body assembly. If the screws are loosened, the sensor incorporated in the resin cover becomes misaligned and the throttle body can not work normally.**

Pre-removal Operation	Post-installation Operation
• Engine Cover Removal (Refer to GROUP 11A, Camshaft P.11A-17) • Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service − Engine Coolant Replacement P.14-4). • Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-5).	• Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-5). • Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service − Engine Coolant Replacement P.14-4). • Engine Cover Installation (Refer to GROUP 11A, Camshaft P.11A-17).



Removal steps

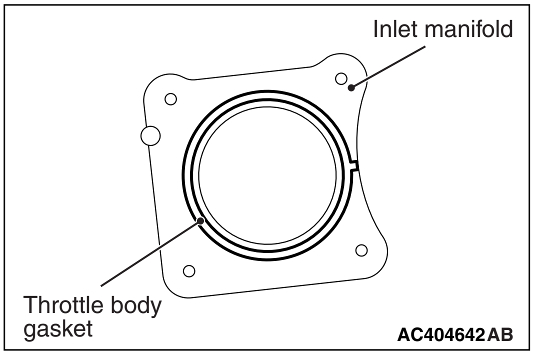
- >>C<< • Initialization (Installation only)
- 1. Electronic control throttle valve connector
- 2. Throttle body water hose connection
- >>B<< 3. Screw

Removal steps (Continued)

- 4. Radiator upper hose clamp
- 5. Throttle body assembly
- >>A<< 6. Throttle body gasket

INSTALLATION SERVICE POINTS

>>A<< THROTTLE BODY GASKET INSTALLATION



Securely insert the throttle body gasket in the groove of the inlet manifold without causing any torsion or damage to the gasket.

>>B<< SCREW INSTALLATION

⚠ CAUTION

Do not over-tighten. As the self-forming-type screw is used, the excessive torque can damage the inlet manifold threads.

>>C<< INITIALIZATION

When the throttle body is installed, removed or replaced, initialize the electronic-controlled throttle valve system according to the procedure below beforehand.

Turn the ignition switch from "ON" position to "LOCK" (OFF) position, and then hold "LOCK" (OFF) position for approximately 10 seconds or more.

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ENGINE-ECU AND ENGINE-CVT-ECU

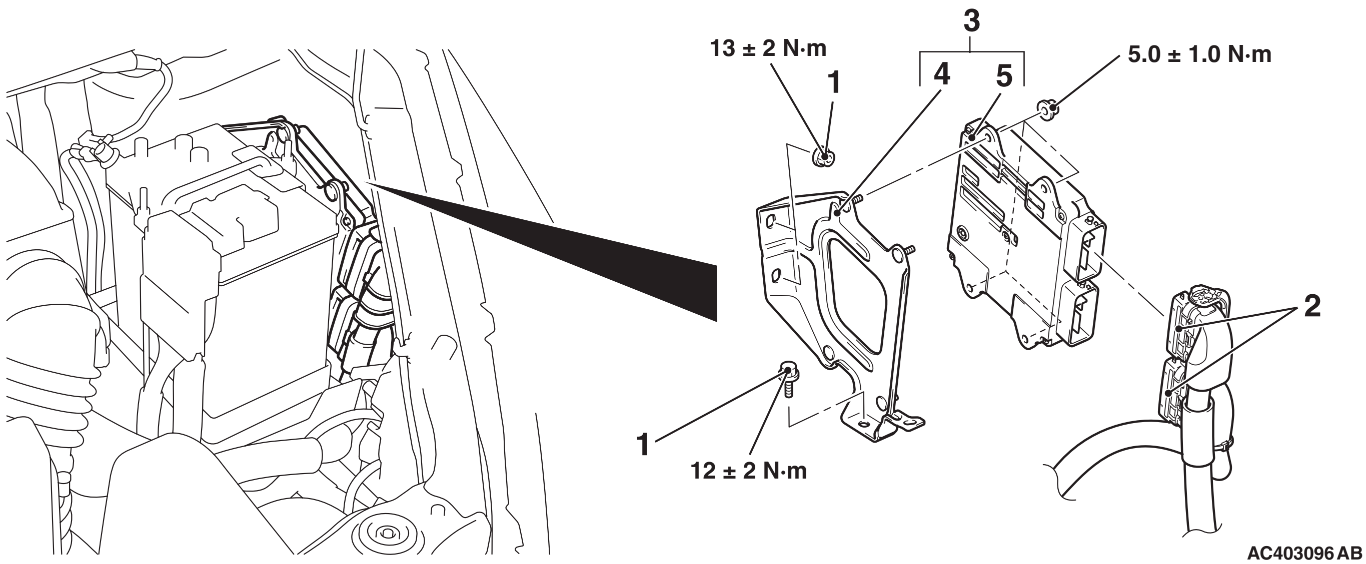
REMOVAL AND INSTALLATION

M1131025800031

⚠ CAUTION

- **When the engine-ECU <M/T> or engine-CVT-ECU <CVT> replacement is performed, always refer to GROUP 54A, Ignition Switch − Encrypted Code Registration Criteria Table P.54A-8.**
- **After the engine-ECU <M/T> or engine-CVT-ECU <CVT> is replaced, idling speed may be unstable because the MPI engine learning is not completed. To make it stable, make the system learn the idling (Refer to GROUP 00 − Precautions before Service, Learning Procedure for Idling in MPI Engine P.00-21).**

Pre-removal and Post-installation Operation Battery Removal and Installation



Removal steps <M/T>

>>**A**<<	•	Initialisation <Installation only>
	1.	Engine-ECU mounting bolt and nut
	2.	Engine-ECU connector
	3.	Engine-ECU and Engine-ECU bracket assembly
	4.	Engine-ECU bracket
	5.	Engine-ECU

Removal steps <CVT>

>>**A**<<	•	Initialisation <Installation only>
	1.	Engine-CVT-ECU mounting bolt and nut
	2.	Engine-CVT-ECU connector
	3.	Engine-CVT-ECU and Engine-CVT-ECU bracket assembly
	4.	Engine-CVT-ECU bracket
	5.	Engine-CVT-ECU

INSTALLATION SERVICE POINT

>>A<< INITIALIZATION

When the engine-ECU <M/T> or engine-CVT-ECU <CVT> is removed, initialise the electronic-controlled throttle valve system according to the following procedure after installing the ECU.

Turn the ignition switch from "ON" position to "LOCK" (OFF) position, and then hold "LOCK" (OFF) position for approximately 10 seconds or more.